STIC Search Report
EIC 2800

STIC Database Tracking Number: 123725

TO: Wasseem Hamdan	From: Jeff Harrison
Location: JEF-9A19	Location: STIC-EIC2800
Art Unit: 2854	JEF-4B68
June 15, 2004	Phone: 22511
Case Serial Number: 10/697,219	Email: harrison, jeff

Search Notes

Examiner Hamdan,

Re: Increasing predictability of press performance,
Production press monitoring system,
Tonal control and compensation, test pattern, density, densitometer

Attached are edited search results from the patent and nonpatent literature.

Based on this, if you have questions or would like a refocused search, please contact me.

Thanks,
Jeff
Jeff Harrison
Team Leader, STIC-EIC2800
JEF-4B68, 571-272-2511

19/TI,PN,PD,AN,AD,IC,AB,AB,K/2 (Item 2 from file: 348)
DIALOG(R)File 348:(c) European Patent Office. All rts. reserv.

An adaptive technique for providing accurate tone reproduction control in an imaging system

PATENT (CC, No, Kind, Date): EP 538901 A2 930428 (Basic)
EP 538901 A3 930915
EP 538901 B1 980520
APPLICATION (CC, No, Date): EP 92118241 921024;
PRIORITY (CC, No, Date): US 782940 911025; US 872258 920422
INTERNATIONAL PATENT CLASS: H04N-001/46;

= US 5255085
= US 5293539

p. 1

ABSTRACT EP 538901 A2

Apparatus and associated methods employed therewith for accurately providing a desired ("Aim") tone reproduction characteristic in an output image through a DDCP (direct digital color proofing) imaging chain (such as that implemented by a raster image processor (200), particularly a screening process (660) occurring therein, and a marking engine (130) and for significantly reducing the number of **test** proof images that need to be produced and measured to achieve this result. Specifically, "Benchmark" operating conditions and intrinsic performance (i.e. "Benchmark" entry point date) of the DDCP imaging chain thereat are first defined. Then, based upon differences (such as in screen ruling and **solid** area density) between a desired operating condition and an appropriate "Benchmark" condition, "Benchmark" values associated with the latter are adapted, through use of a pre-defined model and associated sensitivity coefficients that collectively **predict** the performance of the DDCP imaging chain, to determine corresponding "Adapted" values that accurately specify the intrinsic process tone reproduction characteristic of the imaging chain at the desired operating condition. Thereafter, in response to both "Aim" (400) and the "Adapted" values for the desired operating condition, a look-up table is fabricated to contain, for all possible input dot areas, the "Aim" dot gain modified by the inverse of this expected intrinsic process tone reproduction characteristic applied to the desired tone reproduction characteristic. Incoming dot area values (i.e. contone values) for a corresponding separation are then routed through this table, prior to screening and writing, in order to intentionally vary the tone reproduction value of each such value so that the resulting dots in the proof image will accurately exhibit the desired "Aim" tone reproduction characteristic substantially free from corruption due to the native tone reproduction characteristic of the imaging chain. (see image in original document)

...SPECIFICATION completely specified, a test proof image is to be made, typically using a null dot gain look-up table, at that particular condition and then **densitometrically** measured. The measurements yield the "Process" tone reproduction curve which is then used in conjunction with the desired "Aim" tone reproduction curve to construct appropriate...are provided by a user, these values are then converted into equivalent dot areas. The desired output values can originate through illustratively user input, optical **densitometric** measurements of, for example, a press sheet, or by reading and/or modifying an existing data file of "Aim" values. "Process" values are similarly obtained...

...diamond), solid area density and separation color (cyan, magenta, yellow or black -- C, Y, M or K). These "Process" values, specifically generated through printing a **test pattern** generally using a null dot gain curve specify the inherent native dot gain produced by this imaging chain at that operating condition. The "Process" values, again typically specified for a relatively small number of input dot areas, are obtained through **densitometric** measurement or user input, or by reading and/or modifying an existing data file of "Process" values. "Process" dot gain curves may also be defined...

...an appropriate "Benchmark" operating condition, adapting "Benchmark" values associated with the latter, through use of a pre-defined model and

associated sensitivity coefficients that collectively **predict** the performance of the DDCP imaging chain, to determine corresponding **predicted** process performance values (i.e., "Adapted" process values) that accurately specify the intrinsic process tone reproduction characteristic of the imaging chain that is expected to...to be used. A "Benchmark" would be defined for each such region, though its location therein may vary depending upon color and font and associated **prediction** accuracy.

Once a "Benchmark" condition is chosen, a test proof would be made, using a null tone reproduction curve, at that specific condition and then ...

...found that the specific model I that use for the sublimation dye transfer DDCP imaging chain, specifically a bi-linear model, provides a very accurate **prediction**, for changes such as in screen ruling and solid area density, over a relatively wide region of the operating area using a single "Benchmark" operating...

...of the area(s) of the operating space over which the imaging chain is to actually operate, is advantageously required to fully, accurately and adaptively **predict** the expected process tone reproduction that will occur at any desired user specified operating condition. A test proof needs to be made only at each...and an appropriate "Benchmark" condition, adapting "Benchmark" values associated with the latter, through use of a pre-defined model and associated sensitivity coefficients that collectively **predict** the performance of the DDCP imaging chain, to determine corresponding **predicted** process performance values (i.e., "Adapted" values) that accurately specify the intrinsic process tone reproduction characteristic of the imaging chain that is expected to occur...A "Benchmark" would be defined for each such region, though the location of the "Benchmark" therein may vary depending upon color and font and associated **prediction** accuracy, as discussed in detail below.

Specifically, once a "Benchmark" operating condition is selected, a test proof would be made, using a null dot gain look-up table, at that specific operating condition and then measured with a reflection **densitometer**. The output densities, typically taken from only a small number of input dot areas, are then converted to corresponding output dot areas using equation (6...

...specific model that I use for the sublimation dye transfer imaging chain in DDCP system 100, specifically a bi-linear model, provides a very accurate **prediction** over a relatively wide area of the operating space using a single "Benchmark"operating condition located in that space and a single set of input...

...of the area(s) of the operating space over which the imaging chain is to actually operate, is advantageously required to fully, accurately and adaptively **predict** the expected process tone reproduction that will occur at any desired user specified operating condition. A test proof needs to be made only at each...

...an appropriate marking engine.

DDCP system 100 contains raster image processor (RIP) 200; marking engine 130; operator personal computer (PC) 120 and its associated peripherals: **densitometer** 124, remote diagnostics modem 125 and line printer 128; and laminator 150. Each ...interrogate the status of as well as control both RIP 200 and marking engine 130 and perform diagnostic and set-up operations thereon, as desired. **Densitometer** 124, under control of operator PC 120, is used to measure the density of various test patches generated by the RIP/marking engine imaging chain... of the proofed image as it is being printed. The control strip consists of a series of single color test patches for use in subsequent **densitometric** measurements of the proofing process. Lastly, the data legend enable flag, if set, instructs the RIP to print a data legend, as specified in description...as discussed in detail below (specifically equation (6)), into equivalent dot areas. The desired

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output values can originate through illustratively user input -- as shown, optical **densitometric** measurements of, for example, a press sheet, or by reading and/or modifying an existing data file of "Aim" values. For ease of reference and...

...user chooses to define a "Benchmark" data file, the user instructs the RIP/marking engine imaging chain (through a path not shown) to write a **test pattern** with generally a null dot gain curve at the "Benchmark" operating position. Process output data are then obtained, as represented by dashed line 640, and supplied to process 610 through manual **densitometric** measurement of the proof image followed by keyboard entry or via direct entry to Operator PC 120 from **densitometer** 124. In the case when the **test pattern** is not written with a null dot gain curve, the customized dot gain table that is actually used within table 630 is specified by the...

...cubic function for the "Aim" and "Benchmark" entry point data, I have found that the smooth curvature provided by a cubic function tends to accurately **predict** the performance of the RIP/marking engine imaging chain between adjacent entry points. I have also found that the interpolant must be monotonic, a property...

...empirical studies of actual measured proof data, I have determined that the model in equation (2) can be significantly simplified, while still retaining a +1% **prediction** accuracy, by replacing the sensitivity terms with coefficients (Standard(underscore)density(underscore)sensitivity, Standard(underscore)ruling(underscore)sensitivity and Standard(underscore)interaction) wherein these sensitivities...a proof image at that condition and exhibiting the desired "Aim" curve, all the incoming contone values, for a given color, that are to be **screened** and **printed** for a corresponding separation are routed through a corresponding table for that color within look-up tables 655 to yield resulting code values which, through...values. After this list has been generated, block 730 is performed to: plot the resulting list of interpolated "Aim" values, if desired, on a display **screen** for user verification; to **print** this list, if desired; and then save the interpolated list along with associated "set-up" information and entry point data in a user defined file...As noted above, the use of a monotone piecewise cubic function imparts a needed degree of curvature to the "Aim" (or "Benchmark") data that accurately **predicts** the actual physical performance ...can be differently shaped and sized. In this regard, the contour and size of any such area is predicated on the accuracy with which a **prediction** based upon a predefined modeling equation will provide for changes in operating condition throughout that area. Of course, if a different form of a modeling...

...imaging chain can be accurately modeled by a simple bi-linear equation, other such imaging systems may likely require more complex modeling to achieve sufficient **prediction** accuracy. This, in turn, would likely necessitate use of increasingly sophisticated methodologies for: (a) locating "Benchmark" condition(s) within each desired area of the operating space of the system, as well as (b) selecting which "Benchmark" condition to use in any given imaging situation, in order to achieve sufficiently accurate **prediction**. "Benchmark" location could be accomplished through use of pre-defined rules or criteria.

Furthermore, "Benchmark" data can be stored within the imaging system, such as...

...condition.

While my invention has been described in terms of obtaining "Aim" and "Benchmark" data through any of three specific ways, such as user input, **densitometric** measurements of images or through reading and/or editing an existing file of data, use of my invention is independent of the specific manner in...

...CLAIMS halftone separations, said operating condition is defined by a

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color at which said separation is to be written by the marking engine, a value of **solid** area density and dot font shape that are to be written by the marking engine in said each separation, and a screen ruling that is...

...in claim 5 wherein said output image is a halftone image and the first and second pre-defined operating conditions each comprise a value of **solid** area density and screen ruling at which halftone dots in said output image are to be written by a marking engine.

8. The apparatus as...

...model is bi-linear and comprises corresponding terms and associated pre-determined sensitivity coefficients for relating, at said first pre-defined operating condition, changes in **solid** area density and screen ruling into expected changes in the native tone reproduction characteristic of the imaging system that will occur as a result of...

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...are pre-determined sensitivity coefficients relating changes in density and screen ruling to halftone dot size; and

(DELTA)density and (DELTA)ruling specify differences in **solid** area density and screen ruling between said first and second pre-defined operating conditions.

10. The apparatus as claimed in claim 9 wherein said table...halftone separations, said operating condition is defined by a color at which said separation is to be written by the marking engine, a value of **solid** area density and dot font shape that are to be written by the marking engine in said each separation, and a screen ruling that is...

...in claim 23 wherein said output image is a halftone image and the first and second pre-defined operating conditions each comprise a value of **solid** area density and screen ruling at which halftone dots in said output image are to be written by a marking engine.

26. The method as...

...model is bi-linear and comprises corresponding terms and associated pre-determined sensitivity coefficients for relating, at said first pre-defined operating condition, changes in **solid** area density and screen ruling into expected changes in the native tone reproduction characteristic of the imaging system that will occur as a result of...

...are pre-determined sensitivity coefficients relating changes in density and screen ruling to halftone dot size; and

(DELTA)density and (DELTA)ruling specify differences in **solid** area density and screen ruling between said first and second pre-defined operating conditions.

28. The method as claimed in claim 27 wherein said table...

14jun04 14:58:13 User259284 Session D2800.2

File 248:PIRA 1975-2004/May W5
(c) 2004 Pira International

Set	Items	Description
S1	1862	PLUG???? OR SCREEN?????(2N)DENSIT?????
S2	455	(TEST???? OR REFERENCE)(2N)(SCREEN???? OR PATTERN?????)
S3	151	(SCREEN????(3N)PATTERN?????)
S4	80	(SCREEN????(3N)REFERENCE?)
S5	189	(TEST????(3N)REFERENCE?)
S6	7	S1 AND S2:S5
S7	24	S1:S6 AND SCREEN? AND PRINT? AND TEST? AND PATTERN?
S8	3	S7 AND DENSIT?

14jun04 15:02:12 User259284 Session D2800.3

SYSTEM:OS - DIALOG OneSearch
File 2:INSPEC 1969-2004/Jun W1
(c) 2004 Institution of Electrical Engineers
*File 2: Alert feature enhanced for multiple files, duplicates removal, customized scheduling. See HELP ALERT.
File 6:NTIS 1964-2004/Jun W2
(c) 2004 NTIS, Intl Cpyrght All Rights Res
File 8:Ei Compendex(R) 1970-2004/Jun W1
(c) 2004 Elsevier Eng. Info. Inc.
File 35:Dissertation Abs Online 1861-2004/May
(c) 2004 ProQuest Info&Learning
File 94:JICST-EPlus 1985-2004/May W4
(c)2004 Japan Science and Tech Corp(JST)

Set	Items	Description
S1	10098	TEST????(3N)(SCREEN? OR PRINTSCREEN?)
S2	812	PATTERN?????(3N)(SCREEN? OR PRINTSCREEN?)
S3	21356	PATTERN?????(5N)TEST??????
S4	579	SOLID??(3N)SCREEN???????
S5	50	S1:S4 AND PLUGG?????
S6	58638	(MEASUR????? OR MONITOR???? OR DETECT????? OR SENS??????)(-4N)(DENSE OR DENSIT???)
S7	7258	DENSITOMET????????
S8	80	S1:S3 AND S4:S5
S9	0	6AND8
S10	0	7AND8
S11	47	S1:S3 AND PLUGG??????
S12	36	S1:S3 AND S4
S13	0	S11:S12 AND S6
S14	0	S11:S12 AND S7
S15	412	S4:S6 AND TEST????? AND PATTERN??????
S16	113	S7 AND TEST????? AND PATTERN??????
S17	90	S15:S16 AND (DENSITIES OR DENSITY(4N)(VALUES OR VALUE OR R-ANGE OR RANGES OR RANGED OR RANGING))
S18	1	S17 AND PRINT???????
S19	0	S17 AND PRESS??
S20	0	S17 AND INK??
S21	1961	TEST????? AND SCREEN????? AND (DENSE OR DENSIT??????????)
S22	182	S21 AND (PRESS?? OR PRINT????)
S23	0	S22 AND PLUGG?????
S24	34	S22 AND SOLID
S25	17	S22 AND MAXIMUM
S26	10	S22 AND INK??
S27	5	S24:S26 AND PATTERN??????

14jun04 15:13:39 User259284 Session D2800.4

File 94:JICST-EPlus 1985-2004/May W4
(c)2004 Japan Science and Tech Corp(JST)

Set	Items	Description
S1	870	'TEST PATTERN'
S2	45	PRINT?????? AND S1
S3	5	S2 AND SCREEN??????

14jun04 15:14:35 User259284 Session D2800.5

File 2:INSPEC 1969-2004/Jun W1
(c) 2004 Institution of Electrical Engineers

Set	Items	Description
S1	3519	R1:R3 OR DENSITOMET? OR (SCREEN???? OR PRINT?????)(3N)(DEN-SE OR DENSIT?????? OR CONCENTRATION)
S2	5298	TEST()PATTERN?????
S3	7	1AND2

14jun04 15:17:13 User259284 Session D2800.6

SYSTEM:OS - DIALOG OneSearch
File 348:EUROPEAN PATENTS 1978-2004/Jun W02
(c) 2004 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20040610,UT=20040603
(c) 2004 WIPO/Univentio

Set	Items	Description
S1	7249	TEST???(3N)PATTERN?????
S2	11905	DENSITOMET???????
S3	306	1AND2
S4	22537	SCREEN?????(4N)(PRESS?? OR PRINT?????)
S5	25	3AND4
S6	0	S5 AND PLUGG??????
S7	5	S5 AND (MAXIMUM OR SOLID??)/TI,AB,CM
S8	16	S5 AND INK??/TI,AB,CM
S9	8	S5 AND (COMPENSAT????? OR ADJUST?????? OR CORRECT??????)/T-I,AB,CM
S10	15	S5 AND (PREDICT?????? OR PREDETERMIN???????)
S11	7	8AND9
S12	10	8AND10
S13	7	9AND10
S14	6	11AND12AND13
S15	10	S7 OR S14
S16	7	S15 AND PREDICT????????
S17	4	S16 AND TEST??????/TI,AB,CM
S18	0	S16 AND TESTED/TI,AB,CM
S19	4	S16 AND TEST/TI,AB,CM
S20	0	S16 AND TESTS/TI,AB,CM
S21	0	S16 AND TESTING/TI,AB,CM

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     FILE 'USPATFULL' ENTERED AT 13:32:09 ON 14 JUN 2004
L1          354 S     101484000/NCL
L2          133 S     L1 AND (SYSTEM/TI,AB,CLM)
L3          128 S     L1 AND (PRESS/TI,AB,CLM)
L4           24 S     L1 AND (SCREEN/TI,AB,CLM)
L5            4 S     L1 AND PREDICT?/TI,AB,CLM
L6           51 S     L1 AND MONITOR?/TI,AB,CLM
L7           36 S     L1 AND PRODUCTI?/TI,AB,CLM
L8           36 S     L1 AND (INCREAS##### OR ENHANC#######)/TI,AB,CLM
L9            2 S     L1 AND (PRINTSCREEN? OR PRINT####(W)SCREEN#######)/TI,AB,CLM
L10         254 S     L1 AND (CONTROL#######)/TI,AB,CLM
L11          82 S     L1 AND (CORRECT###### OR COMPENSAT########)/TI,AB,CLM
L12          28 S     L1 AND (TONE## OR TONAL###### OR TONING)/TI,AB,CLM
L13           4 S     L2 AND ((L3 AND L4) OR L9)
L14           1 S     L5 AND L6
L15           1 S     L6 AND L7 AND L8
L16           6 S     L10 AND L11 AND L12
L17          16 S     L5 OR L9 OR L13 OR (L14 OR L15 OR L16)
L18             SEL PLU=ON  L17 1- ICM :       13 TERMS
L19          12 S     L17 AND PRESS
L20             SEL PLU=ON  L19 1- IC :       16 TERMS
L21             SEL PLU=ON  L19 1- ICM :       10 TERMS
L22             SEL PLU=ON  L17 1- PN :       19 TERMS

     FILE 'WPIX, PIRA' ENTERED
L23          16 S     L22
L24       66769 S     (PRINT##### OR PRESS OR PRINTSCREEN OR SCREEN)(4A) CONTROL########
L25       21044 S     (PRINT##### OR PRESS OR PRINTSCREEN OR SCREEN OR
CONTROL########)(4A)(PREDICT######## OR COMPENSAT####### OR FUZZY OR STIOCHAST#########)
L26         737 S     L24 AND L25
L27         120 S     L26 AND (COLOR### OR COLOUR### OR HALFTON? OR TONAL? OR TONE#### OR TONING OR
TINT#### OR HUE##)(7A)(SCREEN? OR CONTROL? OR COMPENSAT? OR CORRECT?)
L28          22 S     L27 AND PREDICT###########
L29          37 S     L26 AND PREDICTION
L30           4 S     L29 AND PRODUCTI###############
L31          15 S     L29 AND PERFORM#########
L32           8 S     L29 AND (INCREAS######### OR ENHANC######### OR IMPROVING OR IMPROVAB? OR
IMPROVE#########)
L33          15 S     (L30 OR L31 OR L32) NOT L28
L34          68 S     L26 AND (CONSISTEN####### OR CONSTANT OR QUALITY OR UNIFORM##### OR
VARIABILITY)(6A)(CONTROL###### OR PREDICT#######)
L35          14 S     L27 AND L34
L36          50 S     L34 AND (MONITOR########## OR DETECT###### OR SENS######## OR COMPENSAT####### OR
CORRECT########)
L37           2 S     L34 AND RELIAB#########
L38           9 S     L35 AND L36
L39           1 S     (L29 OR L30 OR L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR L37 OR L38) AND
PREDICTABILITY
L40           1 S     (L29 OR L30 OR L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR L37 OR L38) AND
MONITOR#######(3A) SYSTEM
L41           8 S     L36 AND PREDICT########
L42          37 S     L33 OR L35 OR (L37 OR L38 OR L39 OR L40 OR L41)
L43          29 S     L42 NOT L28
L44       12351 S     L18
L45           1 S     L44 AND L43
L46          15 S     L43 AND (FEEDBACK OR FEEDING OR FED OR
                FEED OR ADJUST########## OR EVALUAT######## OR MEASUR########)
L47          28 S     L43 NOT L45
L48          14 S     L46 AND L47
L49         199 S     ((L27 OR L28 OR L29 OR L30 OR L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR L37 OR
L38 OR L39 OR L40 OR L41 OR L42 OR L43) OR (L45 OR L46 OR L47 OR L48))
L50         162 S     L49 NOT (L48 OR L28 OR L23 OR L45)
L51          13 S     L50 AND EFFICIEN##########
L52          33 S     L50 AND PERFORM##########
L53           4 S     L51 AND L52
L54          10 S     (L51 OR L52) AND PREDICT#########/TI,CT,ST
L55          12 S     (L53 OR L54)
L56           0 S     (L51 OR L52) AND TONAL#########
L57           4 S     (L51 OR L52) AND TONE######
L58           0 S     (L51 OR L52) AND TONING
L59          15 S     (L55 OR L56 OR L57)
L60           4 S     L59 AND (MONITOR? OR DISPLAY? OR SCREEN?)
L61          11 S     L59 NOT L60
```

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        15jun04 06:51:07 User259284 Session D2801.2

File 350:Derwent WPIX 1963-2004/UD,UM &UP=200437
        (c) 2004   Thomson Derwent

      Set  Items  Description
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      S1       1  PN=EP 538901

? map pn

1 Select Statement(s), 6 Search Term(s)

Serial#SD695


? b 342;ex

        15jun04 06:52:05 User259284 Session D2801.3

File 342:Derwent Patents Citation Indx 1978-04/200433
        (c) 2004 Thomson Derwent

      Set  Items  Description
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Executing SD695
               1  PN=DE 69225553 + PN=EP 538901 + PN=JP 3314883 + PN=JP
                  6006602 + PN=US 5255085 + PN=US 5293539
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1 Select Statement(s), 6 Search Term(s)
Serial#SD696

Executing SD696
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                  6006602 + CT=US 5255085 + CT=US 5293539
      S2      28  Serial: SD696
? map pn

8 Select Statement(s), 91 Search Term(s)
Serial#SD697

? b 350 347 344 348 349;ex
```

15jun04 06:53:08 User259284 Session D2801.4

SYSTEM:OS - DIALOG OneSearch
File 350:Derwent WPIX 1963-2004/UD,UM &UP=200437
File 347:JAPIO Nov 1976-2004/Feb(Updated 040607)
File 344:Chinese Patents Abs Aug 1985-2004/May
File 348:EUROPEAN PATENTS 1978-2004/Jun W02
File 349:PCT FULLTEXT 1979-2002/UB=20040610,UT=20040603

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      Set  Items  Description
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Executing SD697
            13  PN=AU 200049937 + PN=AU 200158580 + PN=AU 721417 + PN=AU 9533713 + PN=AU 9535018 + PN=BR
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                PN=DE 10121785 + PN=DE 10154655 + PN=DE 10201918
            18  PN=DE 19604867 + PN=DE 60004384 + PN=DE 69411430 + PN=DE 69517855 + PN=DE 69518263 + PN=DE
                69715771 + PN=DE 69814450 + PN=EP 1033030 + PN=EP 1222075 + PN=EP 1237354 + PN=EP 1280333 +
                PN=EP 285529 + PN=EP 560165 + PN=EP 619535
            22  PN=EP 673151 + PN=EP 680196 + PN=EP 687102 + PN=EP 700015 + PN=EP 741488 + PN=EP 782735 +
                PN=EP 840497 + PN=ES 2114509 + PN=GB 2298051 + PN=JP 10136209 + PN=JP 10506460 + PN=JP
                11055534 + PN=JP 2000228715 + PN=JP 2001523603
            24  PN=JP 3077873 + PN=JP 5316351 + PN=JP 6054195 + PN=JP
                6317964 + PN=JP 7038687 + PN=JP 7232429 + PN=JP 7299932 +
                PN=JP 7333822 + PN=JP 8070384 + PN=JP 8190371 + PN=JP
                8238827 + PN=JP 8307689 + PN=MX 186278 + PN=US 2001012110
             8  PN=US 2002122081 + PN=US 2003020776 + PN=US 2003136288 +
                PN=US 2003169437 + PN=US 2004012647 + PN=US 5333069 +
                PN=US 5365847 + PN=US 5471313 + PN=US 5510896 + PN=US
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            14  PN=US 5625716 + PN=US 5671298 + PN=US 5737452 + PN=US
                5748330 + PN=US 5752057 + PN=US 5774639 + PN=US 5875258 +
                PN=US 6011906 + PN=US 6055064 + PN=US 6067406 + PN=US
                6191867 + PN=US 6313924 + PN=US 6382099 + PN=US 6411318
            15  PN=US 6529643 + PN=US 6684790 + PN=US 6717601 + PN=WO
                200069645 + PN=WO 200191453 + PN=WO 9609599 + PN=WO
                9610237 + PN=WO 9926407
            65  S1:S7
       S1   65  Serial: SD697
```

Set	Items	Description
S1	65	S1:S7
S2	0	S1 AND (PLUG OR PLUGS OR PLUGG????)(3N)(INK???? OR DENSIT???? OR DENS??? OR SOLID??)
S3	4	S1 AND MAXIMUM??(2N)(DENSIT???? OR DENS????? OR SOLID??)
S4	24116	TEST????(2N)(PATTERN??? OR CHART?? OR TARGET??)
S5	2	3AND4
S6	0	S1 AND PLUGG????
S7	5	S1 AND DENSITOM???????
S8	3	3AND7
S9	1	S8 NOT S5
S10	5	1AND4
S11	3	S10 NOT (S8 OR S5)
S12	9	S3 OR S5:S11
S13	6	S12 AND (PREDICT???????? OR PREDETERMIN???????)
S14	1	S13 NOT (S11 OR S8 OR S5)

123725

SEARCH REQUEST FORM **Scientific and Technical Information Center - EIC2800**

Rev. 3/15/2004 This is an experimental format -- Please give suggestions or comments to Jeff Harrison, JEF-4B68, 272-2511.

Date 6/3/04 Serial # 10/697,219 IFW Priority Application Date 10/31/02

Your Name WASSEEM HAMDAN Examiner # 75440

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06-03-04 P01:30

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Circle: USPT DWPI EPO Abs JPO Abs IBM TDB

Other:

What relevant art have you found so far? Please attach pertinent citations or Information Disclosure Statements. I.DS

What types of references would you like? Please checkmark:

Primary Refs ✓ Nonpatent Literature ✓ Other

Secondary Refs Foreign Patents ✓

Teaching Refs

What is the topic, such as the **novelty**, motivation, utility, or other specific facets defining the desired **focus** of this search? Please include the concepts, synonyms, keywords, acronyms, registry numbers, definitions, structures, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract and pertinent claims.

~~A~~ system for increasing the predictability of press performance, through the use of a predicti press monitoring system.

6-15-04 Jeff Harrison

DPCI / ~~J~~ ICSTE-PLUS STIC EIC2800

PIRA / 348,349 fulltext JEF 4-B68

22511

9/3,AB,K/1 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00857708
CALIBRATING PRINTING MACHINES
Patent Applicant/Inventor:
PRIEST Mark, 40 Holly Road, Freezywater, Enfield, Middlesex EN3 6QB, GB,
Patent and Priority Information (Country, Number, Date):
Patent: **WO 200191453** A1 20011129 (WO 0191453)
Priority Application: GB 200012457 20000522
English Abstract
A method of calibrating a computer-controlled printing machine to produce printed copies of an original image to a pre-determined standard, comprises: using the printing machine to print a reproduction of a step wedge, having patches with densities concentrated in a central region of the density range, with the machine set to dot gain values corresponding to pre-determined density values on a standard dot gain profile; formulating a revised dot gain profile having the same shape as the standard dot gain profile but with a maximum dot gain which is equal to the maximum measured dot gain and which is located at the **density** having the **maximum** measured dot gain; determining revised dot gain values for the predetermined density values from the revised dot gain profile; and setting the dot gain values in the printing machine in accordance with the revised dot gain values.

Detailed Description
... of each of the ink patches on the resulting printed strip produced by the printing machine is then measured using an instrument known as a **densitometer** which is effectively a reflection photometer arranged to provide an optical measurement of the density of each patch on the printed strip. The deviations of...

...measuring the density values of the patches of the printed reproduction of the step wedge; determining from the measured density values the position of the **density** exhibiting **maximum** measured dot gain; formulating a revised dot gain profile having the same shape as the standard dot gain profile but with a maximum dot gain which is equal to the maximum measured dot gain and which is located at the **density** having the **maximum** measured dot gain;
determining revised dot gain values for the predetermined density values from the revised dot gain profile; and setting the dot gain values...of a standard step wedge having a sequence of colour patches of different standard densities, measuring the density of the resulting printed patches using a **densitometer** in the form of a reflection photometer, determining the difference between the measured density data and the standard density data of the step wedge and...

...by the Applicant has revealed that one factor responsible for the lack of accuracy in the additional calibration procedure is the inherent inaccuracy of the **densitometer**, particularly as used to measure densities at the extreme ends of the density range corresponding to highlights and shadows.

...43 and 62 respectively) were found to print with the same characteristics, the maximum dot gain for the 43 screen ruling value being at 50% **density** and the **maximum** dot gain for the 62 screen ruling value being closer to 60%.

is at its maximum, ...software 3A of the computer includes calibration software which is adapted in step S3 to deten-nine from the measured values the position of the **density** exhibiting the **maximum** measured dot gain, in step S4 to formulate a revised dot gain profile having the same shape as the standard dot gain profile but with a maximum dot gain which is equal to the maximum measured dot gain and which is located at the **density** having the **maximum** measured dot gain, in step S5 to determine revised dot gain values for the predetermined density values from the revised dot gain profile and in...

Claim
... standard dot gain profile but with a maximum dot gain which is equal to the maximum measured dot gain and which is located at the **density** having the **maximum** measured dot gain; determining revised dot gain values for the predetermined density values
from the revised dot gain profile; and setting the dot gain values...

L28 **ANSWER** 11 OF 22 **PIRA COPYRIGHT PIRA on STN**
AN 2002:17629 PIRA Full-text
DN 20218241
TI Color management and ICC profiles: can't live without it so learn to live with it!
AU Fleming P D; Sharma A
SO Gravure, (2002) vol. 16, no. 4, Aug. 2002, pp 56-65. ISSN: 0894-4946.
DT JOURNAL
LA ENGLISH
FS 08; PP (Printing and Publishing) ; PT (Printing Abstracts)
AB The management and **control** of **colour** is essential in the **printing** process. Accurate **colour control** is vital if **predictable print** quality is to be achieved. It can be costly **controlling colour**, which needs to be **controlled** between input, display and **print** . Colorimeters, densitometers and spectrophotometers are essential tools for **controlling colour**. New hardware and software tools make quantification possible, but do not solve all the problems associated with colour reproduction. The main problems associated with the handling of colour involve the different mechanisms whereby different devices perceive colour. The International Color Consortium (ICC) has defined standards for colour device characterisation. Those working in the printing and imaging industries need to understand various aspects of colour management, including ICC profiles, colour spaces, tolerance, gamut and rendering. It is important to have a quality measure for ICC profiles to show how a device has been characterised properly. Profiles are needed for the scanners, printers and display devices. (10 fig, 3 tab, 32 ref)

L28 **ANSWER** 21 OF 22 **PIRA COPYRIGHT PIRA on STN**
AN 89:13844 PIRA Full-text
DN 02-90-00640
TI COLOR THAT POPS
AU Petersen D
SO Am. Printer, (1989) vol. 203, no. 6, Sept. 1989, pp 48-50, 52, 54.
DT JOURNAL
LA ENGLISH
FS 02; PR (Printing Abstracts)

AB Print analysis, performed during makeready, transferring information directly from a densitometer to a personal computer, creates a database of press printing characteristics. Prints match customer-supplied colour proofs, and variations during runs may be monitored and controlled. These systems lead to statistical process control, SPC; this will be used by 65% of US printers in the late 1990s. Densitometer readings are thereby speeded up very considerably. HunterLab, Virginia, offer the **Printed** Image **Color Control** System (PICCS) 4000, with an SPC system built into the software. Histograms and **control** charts are produced, enabling **prediction** of how **printed** colours will appear. The program calculates dot gain, ink trapping, print contrast, and other variables; the press is modified accordingly. Du Pont's Print Expert measures a three-component, grey patch with the colour bars, classifying images. Other modifications are now available.

8/9/3

DIALOG(R)File 248:PIRA

00070745 Pira Acc. Num.: 3563645 Pira Abstract Numbers: 12-80-03645

Title: DIGITAL SCREENLESS AND HALFTONE TECHNIQUES FOR RASTER PROCESSING

Authors: Rosenthal R L

Source: GOV. REP. ANNOUNCE. Report no ETL-ROO3 Fort Belvoir VA: Army Engineer Topographic Laboratories 14 Jan 1980 13pp; Gov Rep Announce vol 80 no 12 6 June 1980 p 2034 (SS)

Publication Year: 1980

Document Type: Journal Article

Language: unspecified

Pira Subfiles: Printing Abstracts (PR)

Journal Announcement: 8011

Abstract: The development of raster processing programs at USAETL has included programs for the generation of raster pilot data containing cartographically symbolized features as well as the more widely investigated raster-to-vector software. Raster pilot data may be used to generate film negatives with open window areas over which mechanical **screens** can be placed by conventional contact **printing** techniques. These areas can also be filled with digitally generated **screens**, a capability unique with the raster approach. Further, since most available raster plotting hardware does not permit the modulation of each pixel for intensity, it is desirable to control groups of pixels in order to approximate a halftone dot for color or **density** control. A study was made to determine the suitability of the 25 micron pixel raster on the Digital Laser Platemaker for the generation of digital **screens** for absolute color and process color **printing. Tests** will be conducted to establish **screen pattern** and angle criteria to achieve desired results without moire.

L23 **ANSWER** 1 OF 16 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 2004-024678 [03] WPIX Full-text
DNN N2004-019372
TI Dot gain calibration system for proofing printer, calculates tone reproduction curve based on measured current printing parameter, database information and target parameters, and transmits curve to printing location.
DC P74 S06 T01
IN FISHER, Y; KOIFMAN, I; WEISS, A
PA (CREO-N) CREO IL LTD
CYC 32
PI EP 1365576 A2 20031126 (200403)* EN 21 H04N001-407
US 2003217662 A1 20031127 (200403) B41F001-54 <--
ADT EP 1365576 A2 EP 2003-11658 20030522; US 2003217662 A1 Provisional US 2002-382525P 20020522, US 2003-442302 20030521
PRAI US 2002-382525P 20020522; US 2003-442302 20030521
IC ICM B41F001-54; H04N001-407
ICS H04N001-405; H04N001-52
AB EP 1365576 A UPAB: 20040112

NOVELTY - A calculation unit calculates tone reproduction curve, based on received current printing parameters, database information and target parameters and transmits the curve to printing location.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) digital calibration strip; and

(2) dot gain prediction method.

USE - For prepress system and press or proofing printer.

ADVANTAGE - Capable of reproducing correct tone reproduction curve, according to specific requirements.

DESCRIPTION OF DRAWING(S) - The figure shows the flowchart explaining the dot gain calibration process.

19/TI,PN,PD,AN,AD,IC,AB,AB,K/1 (Item 1 from file: 348)

Dot gain calibration method and apparatus

PATENT (CC, No, Kind, Date): EP 1365576 A2 031126 (Basic)
APPLICATION (CC, No, Date): EP 2003011658 030522;
PRIORITY (CC, No, Date): US 382525 P 020522
INTERNATIONAL PATENT CLASS: H04N-001/407; H04N-001/405; H04N-001/52

ABSTRACT EP 1365576 A2
A dot gain calibration system which calculates a tone reproduction curve based on measured current printing parameters. A method for providing in use estimation of dot gain in digital printing using digital printing plates, the method comprising: applying to a digital printing plate a calibration strip, the strip comprising at least one set of patches, each patch comprising a plurality of dots at a **predetermined** gray level within said dynamic range, gray levels of said set of patches being distributed over said dynamic range, printing from said calibration strip under a current set of printing conditions, measuring intensities of said printing, and interpolating from said measurements to generate a curve of dot gain over said dynamic range. The curve can then be used to **compensate**. When moving to a different set of printing conditions, a single **test** print is then carried out and a new dot gain estimation is available.

p. 1

...SPECIFICATION on the printing plate. The magnitude of the dot gain depends on factors such as the ink absorption characteristics of the paper, the ink, the **screening** parameters and the **press** variables.
The total measured dot gain on the paper is a combination of two separate and unrelated gain factors; plate-related dot gain and press...

...a prepress system and a CTP (Computer to Plate) or CTF (Computer to Film) machine to create dedicated four plates, one for each color, with **test patterns** for measurement of the dot gain for different file values for each of the four colors;
2. Loading the plates onto a press and performing...

...to use new paper stock or less predicable kinds of paper such as recycled paper stock. Printers also try to avoid changing to higher quality **screen** sets, thus saving valuable **press** and make-ready time by working with familiar dot gains.
Another common technique used in press sites due to the high cost of the current...

...fourth parameter; and said calculating unit further comprises an extrapolation unit configured to carry out extrapolating or interpolating from said obtained measurements to obtain values **predicting** dot gain for said first parameter in combination with said second parameter, therefrom to generate said curve for sending to said printing location.
Preferably, said...
...of said current printing parameters;

and said calculating unit comprises an extrapolation unit configured for extrapolating or interpolating from said obtained measurements to obtain values **predicting** dot gain for said one of said current printing parameters; therefrom for generating said curve for sending to said printing locations.
According to a second...

...one of a range of screen parameters sets.
According to a fourth aspect of the present invention there is provided a method of in use **prediction** of dot gain in a scheduled printing using printing plates, the method comprising the steps of:

providing parameters of said scheduled printing including a set...

...obtaining from said database measurement data for said third parameter in combination with said fourth parameter; and

extrapolating from said obtained measurements to obtain values **predicting** said first parameter in combination with said second parameter.

Preferably, receiving said calibrated tone reproduction curve comprises:

obtaining from a database measurement data for a plurality of values of one of said current printing parameters; and

extrapolating or interpolating from said obtained measurements to obtain values **predicting** dot gain for said one of said current printing parameters.

Preferably, receiving said calibrated tone reproduction curve comprises extrapolating or interpolating from said measured parameters to obtain values **predicting** dot gain for said one of said current printing parameters.

Preferably, said step of producing said calibrated tone reproduction curve comprises superpositioning said basic shapes into shapes representative of said current printing parameters, therefrom to obtain values **predicting** dot gain for said current printing parameters.

Preferably, said providing parameters comprises searching a database to determine the presence of dot gain compensation data corresponding...

p. 2

...the present embodiments, as will be later described in detail, comprises one or more sets of patches 14.1..14.n. Each patch contains a **predetermined** tone level, so that the entire set of patches gives a set of samples over the dynamic range. It will be appreciated that a given...

...for the measured dot gain.

Reference is now made to Fig. 2, which is a graph showing typical dot gain against intensity characteristics under different **printing** conditions or **screen** sets, specifically FM, 150 lines per inch, 175 lines per inch and 200 lines per inch. It will be noted that the curves are far...a case, the best way to generate a calibration strip according to the present embodiments is to use a different set of patches for each **screen** set. Other **printers** may not be so restricted. In such a case, a general-purpose calibration strip may be constructed by using patches of a given gray level, constructed not out of conventional dots but out of basic shapes. The shapes are selected to be superimposable, to provide any set of **screen** parameters. The plate is **printed** and the resulting print is scanned into a computer, which carries out the superposition to determine the density for the desired screen parameters.

Reference is...

...a printing plate. As explained, the strip comprises one or more sets of patches, and each patch has a plurality of dots set to a **predetermined** tone level within the dynamic range of the intended printing intensity. The strip is then used in a stage S2 to print from the plate under a given set of printing conditions, upon the server's request, in case it cannot provide a **predicted** tone reproduction curve from existing data in the database. The set of conditions may include a given ink, a given paper type and a given...

...allows the correct compensation at each location to give a uniform result.

The system and method of the present embodiments may be advantageously used to **predict** dot gain, by interpolating data residing in the dot gain database. For example:

a. If one of the screen parameters, say the mesh, of the required print is different from that in data currently held in the database, a **prediction** of the dot gain for the new mesh may be done by interpolating/extrapolating between, say, three existing database samples for varying values of mesh, with other parameters being equal. Similarly, a **prediction** may be made for a different screen angle or dot shape.

If the calibration strip used comprises basic shapes, as mentioned above, **prediction** may be carried out by superimposing the various basic shapes to create the required screen cell shapes.

b. If **prediction** is required for different printing conditions, such as different press, paper or ink, possibly also including changes in screen parameters, existing database measurements may similarly be used. For example, if the combination of Press2 and Paper2 is new, **prediction** may be carried out by using previous database data for the same Press2 with a different Paper1, data for another Press1 with Paper1 and data...

...by the DFE (Digital front End) or CTP device. The strip may take on one of two forms, depending on the way that the individual **printing** entity uses **screen** sets. Some **printing** entity for example may use only a limited range of screen sets whereas others may use a much wider or unlimited range.

1. If a...

...or unlimited use, the new strip comprises a prescreened set of basic screen dots that can then be used to extrapolate the values of the **predicted** dot gain for any screen set. The strip includes patches of basic shapes and sizes, which enable the calculation of **predicted** dot gain for many combinations of press, press setup, paper and ink. The **prediction** is done by measuring the dot gain

on the printed strip shapes, and carrying out superposition of the basic shapes to achieve the actual dot...

p. 3

...used with the present embodiments may be any device capable of measuring reflected light from a printed page. One possibility is to use a scanning **densitometer** device. Such a device is preferably capable of measuring the dot % for each patch of the dot gain strip. The digital value identifying each patch...

...is online then the result may be sent automatically to the Dot Gain Database.

A convenient alternative for the dot % measuring device is a Pressman **densitometer**, which may be either a table integral or stand-alone **densitometer** device as available in the pressroom.

Dot Gain Database

A database may be provided with the preferred embodiments. The database preferably resides on a server...

...compensated plates..

Obtained dot gain characteristics may be in the form of measured dot gain values or curves of dot gain, for various combinations of **press**, paper, ink and **screening** parameters. The database may be continuously updated with new values or curves every time measurements are submitted.

Predefined target or required values may be defined...

...will be used to print a job on the new paper stock) and extrapolation is carried out to provide a curve to serve as a **prediction** for the dot gain of the next print job using the new paper stock.

If the second type of control strip was used, the basic...

...gain, from which computerized superimposition as described hereinbelow, is used. The superimposition is used as the basis for the curve, which may then provide a **prediction** for any screen-set to be used.

The measured results are saved in the Database.

The prepress side of the workflow process operates as follows...

...following an exemplary process flow is given for generating a calibration strip for one to three screen set parameters:

1. The strip to be generated **predicts** a tone reproduction curve of a certain screen frequency / angle based on measurements of printed samples with the same conditions but with different screen frequency...

...range.

c. From the chart exemplified by Fig. 2, which shows curves for several screen frequencies , it is possible to build a mathematical transformation between **screen** frequencies whilst **press** parameters remain unchanged.

d. A first test is carried out using 5 specific gray level or intensity points (5,25.50.75,100) and each...

...In the following, a process flow is given for generating a strip for an unlimited range of screen parameters.

The strip for unlimited screen parameters **predicts** a tone reproduction curve using on a certain dot shape and mesh or screen ruling based on measurements of printed samples with a set of...

...and the subsequent superimposition of the shapes to obtain any desired dot shape. Preferably the process characterizes the behavior of ink-on-paper.

Dot gain **prediction** using superposition is described below, based on the assumption that any screen cell may be constructed by means of superposition of a suitable core element...

...these basic elements, i.e. the core and the shapes that constrain the contour, the dot gain for the specific shape/screen cell can be **predicted** by mathematical calculations describing the growth factor for each element and overlapping between them.

Reference is now made to Fig. 6, which shows side by...

...CLAIMS and required target values from said printing location and information from said database, therefrom to generate tone reproduction parameters to be used in printing to **compensate** for dot gain, said generator further comprising:

a calculation unit connected to said input for receiving said current printing parameters, said database information and said...

...3. The system of claim 1, wherein said dot gain comprises press dot gain factors, said press dot gain factors comprising at least one of:

ink type;
paper type; and
press type.

4. The system of claim 1, wherein said input is configured to receive from said database measurement data for...

...fourth parameter;

wherein said calculating unit further comprises an extrapolation unit configured to carry out extrapolating or interpolating from said obtained measurements to obtain values **predicting** dot gain for said first parameter in combination with said second parameter, therefrom to generate said curve for sending to said printing location.

5. The...

...said current printing parameters;

and wherein said calculating unit comprises an extrapolation unit configured for extrapolating or interpolating from said obtained measurements to obtain values **predicting** dot gain for said one of said current printing parameters; therefrom for generating said curve for sending to said printing locations.

6. A digital calibration...

...ones of said plurality of patches allows simulation of any one of a range of screen parameters sets.

9. A method of providing in use **prediction** of dot gain in a scheduled printing using printing plates, the method comprising the steps of:

p 4

providing parameters of said scheduled printing including a set of required density values, ; and
obtaining a calibrated tone reproduction curve corresponding to said parameters, said curve indicative of **compensation** for dot gain.

10. The method of claim 9, wherein said scheduled printing uses a printing plate comprising a plurality of sets of patches, each...

...wherein each of said patches within each set represents a specific gray level, said providing additionally comprising::
issuing a measurement request;
printing at least one **test** sheet using said calibration strip;
measuring said printed calibration strip; and
providing said measurements for generation of said tone reproduction curve.

11. The method of...

...basic shape composed of a respectively different preselected layout of laser dots, wherein said providing additionally comprises:
issuing a measurement request;
printing at least one **test** sheets using said printing plate;
measuring intensities from said printed calibration strip; and
providing said measurements for generation of said tone reproduction curve .

p. 5

12. The method of claim 9, wherein said providing additionally comprises:
issuing a measurement request;
printing one or more **test** sheets using a currently mounted printing plate comprising a calibration strip, said printing according to said scheduled printing parameters; the calibration strip comprising a plurality...

...generation of said tone reproduction curve .

13. The method of claim 9, wherein said providing additionally comprises:

issuing a measurement request;
printing one or more **test** sheets using a currently mounted printing plate comprising a calibration strip, said printing according to said scheduled printing parameters, the calibration strip comprising a plurality...

...one of claims 9 through 13, wherein said scheduled printing parameters comprise any combination of parameters from the group consisting of press type, paper type, **ink** type and screening parameters.

15. The method of any one of claims 10 and 12, wherein said obtaining said calibrated tone reproduction curve comprises the...

...obtaining from said database measurement data for said third parameter in combination with said fourth parameter; and
extrapolating from said obtained measurements to obtain values **predicting** said first parameter in combination with said second parameter.

16. The method of any one of claims 10 and 12, wherein receiving said calibrated tone...

...measurement data for a plurality of values of one of said current printing parameters; and
extrapolating or interpolating from said obtained measurements to obtain values **predicting** dot gain for said one of said current printing parameters.

17. The method of any one of claims 10 and 12, wherein receiving said calibrated tone reproduction curve comprises extrapolating or interpolating from said measured parameters to obtain values **predicting** dot gain for said one of said current printing parameters.

18. The method of any one of claims 11 and 13, wherein said step of producing said calibrated tone reproduction curve comprises superpositioning said basic shapes into shapes representative of said

current printing parameters, therefrom to obtain values **predicting** dot gain for said current printing parameters.

19. The method of claim 9, wherein said providing parameters comprises searching a database to determine the presence of dot gain **compensation** data corresponding to said provided parameters,

using said **compensation** data to obtain said tone reproduction curve if found, otherwise:

obtaining intensity measurements from printing of a calibration strip, and

using said intensity measurements to...

p. 6

L48 **ANSWER** 7 OF 14 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 1984-251567 [41] WPIX DNN N1984-187891
TI Exposure **control** for photographic **printer** - has **stepped test negative and test print is scanned** in four channels.
IN IKEURA, H; NISHIDA, S
PA (NORI-N) NORITSU KENKYU CENTER CO

PI DE 3410245 A 19841004 (198441)* 29
US 4611918 A 19860916 (198640)
GB 2139774 B 19861008 (198641)

PRAI JP 1983-47978 19830324; JP 1983-109309 19830620

AB DE 3410245 A UPAB: 19930925

The test negative has stepped densities in each of the three base colours and a shading strip. The exposed- and processed test negative is scanned in the four parameters and an automatic **correction** signal is derived for each parameter to regulate the automatic printer.

The stepped regions have indices corresponding to set **correction** steps in the filter settings for each channel. The **control compensates** for differences in the paper **quality**, especially when the paper ages.

USE - Photographic printers.

ABEQ DE 3410245 C UPAB: 19930925

The colour printing process for photographic systems has a test process prior to each series of prints. This comprises eight test exposures, from standard negative with each of the four variable parameters exposed individually one setting away from the metered value.
The four parameters comprise density and the three basic colours. During each test exposure only one parameter is varied away from the standard at a time. A processor **measures** the densities of the test exposures.
ADVANTAGE - Rapid determination of exposure conditions for each new batch of print paper.

ABEQ GB 2139774 B UPAB: 19930925

A method for determining the optimum exposure conditions for photographic colour printing from a colour negative or transparency using given colour photographic material, which method comprises: (a) providing a **colour** printer having four series of exposure condition **correction** keys, namely overall density, yellow, magenta and cyan **correction** keys, each series of keys providing a plurality of uniformly increasing and decreasing exposure **correction** factors (including zero **correction** factors); (b) preparing a plurality of test prints from a standard colour transparency or negative using the said printer and given colour photographic material under different exposure conditions including exposure conditions in which one of the said exposure condition **correction** keys is set at an exposure **correction** factor other than zero with the remaining said exposure condition **correction** factors being set at zero; (c) comparing the overall yellow, magenta and cyan densities of the test prints with those of a standard colour print produced by any suitable method; the different exposure conditions for the test prints being chosen such that a change in optical density per unit change of **correction** key can be determined for each **colour** component; and (d) using the said comparison to determine the exposure condition **correction** key settings required to produce a print from any colour transparency or negative of quality for the said colour transparency or negative equivalent to that of the standard print using the said printer and given colour photographic material.

ABEQ US 4611918 The method involves preparing a number of test prints under different exposure conditions using a standard negative film. The optical density is **measured** for each colour component on the test prints and is compared with that of corresponding colour component on a standard print. **Detecting** change in density per unit positional change of **correction** key on each of the test prints with respect to each **colour** component. The value required for **correcting** density difference between each test print and standard print is determined.
The **colour** printer includes four lines of exposure **correction** keys comprising density, yellow, magenta and cyan keys. An exposure condition for test prints is determined so that one exposure condition **correction** key is selected from the four lines and is ranked above or below normal keys.

ADVANTAGE - Quick determination of **correct** exposure.

L48 **ANSWER** 14 OF 14 **PIRA COPYRIGHT PIRA on STN**
AN 91:18390 PIRA Full-text
DN 08-92-PT01805
TI GATF FREQUENCY MODULATED ACUTANCE GUIDE
AU Stanton A; Warner R
SO (1991) Paper presented at TAGA Proceedings 1991 held 5-8 May 1991 at Rochester, NY, USA, pp 638-653 [Rochester, NY, USA: Technical Association of the Graphic Arts, 1991, 774pp, (655.1.001.891)(9391)].
DT CONFERENCE
LA ENGLISH
FS 08; PP (Printing and Publishing) ; PT (Printing Abstracts)
AB Subjective **evaluation** is sometimes necessary for **print quality control**. The presentation examines the psychometric attribute of image sharpness, and proposes a quantitative index correlating with visual **sensation** of image sharpness using the GATF Frequency Modulated Acutance Guide, or 'FM Target'. This new test image comprises a series of distinct patches, containing precision line elements distributed in a frequency modulated array. All line elements have 15 microns width, but vary in frequency of occurrence from a coarse pattern of 300cpi to a fine, 1,400cpi pattern. Sharpness analysis involves comparing **print** optical densities with those **predicted** theoretically, their ratios being used to calculate an index of acutance. The technique is more applicable to film than to printed substrates.

8/9/2
DIALOG(R)File 248:PIRA

00233007 Pira Acc. Num.: 10085533 Pira Abstract Numbers: 08-91-PT02639
Title: GREAVES ON GARMENTS
Authors: Greaves R
Source: Screen Print. vol. 81, no. 4, Apr. 1991, pp 38, 40, 94
ISSN: 0036-9594
Publication Year: 1991
Document Type: Journal Article
Language: English
Pira Subfiles: Printing and Publishing (PP); Printing Abstracts (PT)
Journal Announcement: 9108
Abstract: The author suggests a simple five-step method for ensuring that four-colour process **printing** on clothing is achieved with the desired effects. The squeegee should first be adjusted until all dots **print** at the proper size with a **test pattern.** Once this is obtained and the correct pressure has been determined, ink **density** should be adjusted with clear halftone base. The **test screens** can be removed and the real job can be carried out with the same tension, stencil, squeegee and pressure.

3/9/2

DIALOG(R)File 2:INSPEC

6542319 INSPEC Abstract Number: A2000-09-0768-002, B2000-05-7230G-034

Title: Image quality of digital photography prints. II. Dependence of print quality on pixel condition of input camera

Author(s): Ohno, S.; Takakura, N.; Kato, N.
Author Affiliation: B&P & PNC Co., Sony Corp., Atsugi, Japan

Journal: Journal of Imaging Science and Technology vol.44, no.1 p. 51-60
Publisher: Soc. Imaging Sci. & Technol,
Publication Date: Jan.-Feb. 2000 Country of Publication: USA
CODEN: JIMTE6 ISSN: 1062-3701
SICI: 1062-3701(200001/02)44:1L.51:IQDP;1-B
Material Identity Number: P571-2000-002
Language: English Document Type: Journal Paper (JP)
Treatment: Experimental (X)

Abstract: In digital photography, input photoimages to the electronic camera are sampled by segmental imager and converted into image data. The smallest unit of division is called a pixel and the segmentation fixes the size and number of those pixels. Output picture definition is directly related to the pixel number of the input imager. Moreover the image processing to modify the pixel condition influenced the tonal quality of output image. This article discusses the relationship between the conditions of pixel in the imager of the input digital still cameras (DSC) and the image quality of output prints in a digital photography system. Sample color prints showing the same **test pattern** images in different definition proportional to the numbers of pixel were produced by a single digital photography system. The correlation between the pixel condition of input device and the structural and tonal image quality of output prints were apparent to the subjective visual examination and the objective physical analyses. The effects of pixel condition appeared in the drastic MTF changes on the image structure and the apparent definition changes on the tone rendition of reproductions on the sample prints. The results suggest that there is a limiting pixel number for digital cameras to produce satisfactory hand-held size digital photography color prints. (9 Refs)

Identifiers: densitometry; colorimetry

L48 **ANSWER** 12 OF 14 **PIRA COPYRIGHT PIRA on STN**

AN 1998:421 PIRA Full-text

DN 20095345

TI Improved print quality through the use of a densitometer

AU Clifford P

SO Newspap. Technol. $IS=1052-5572, (1997) Sept. 1997, pp 16, 19.

DT JOURNAL

LA ENGLISH

FS 08; PP (Printing and Publishing) ; PT (Printing Abstracts) ; PU (World Publishing Monitor)

AB A densitometer controls the thickness of the ink film being printed. As newspaper printing involves ink absorption into the paper, **controlled** inking yields smoother **printed** ink film, better trapping, and sharper halftones. Increased ink density improves contrast, and increases ink consumption dramatically. Densitometry enables the analysis of the impression to **measure** dot gain, print contrast, hue error, greyness, and trapping efficiency. **Monitoring** dot gain during **printing** allows **compensating** for it in preparing **colour** separations and plates. Shadow area clarity is **measured** by solid density comparison. Plotting hue error and greyness coordinates shows the working colour area, and traps. Densitometry is also helpful in statistical process **control**, statistical **quality control**, **press** unit fingerprinting, and continuous **quality control** using grey bars.

3/9/4
DIALOG(R)File 94:JICST-EPlus

00812233 JICST ACCESSION NUMBER: 89A0038179 FILE SEGMENT: JICST-E
Improvement of **print** position accuracy for **screen printing.**
TANEDA YASUO (1); MATSUMOTO KAZUO (1); SASAGAWA MITSUNORI (2); ICHIKAWA TAKASHI (3)
(1) Chiba Univ., Faculty of Engineering; (2) Kosaido; (3) Nyuronguseimitsukogyo
Purinto Kairo Gakkai Gakujutsu Koen Taikai Koen Ronbunshu, 1988, VOL.3rd, PAGE.77-80, FIG.13
JOURNAL NUMBER: X0498AAW
UNIVERSAL DECIMAL CLASSIFICATION: 621.3.049.75 621.382.002.2
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Conference Proceeding
ARTICLE TYPE: Short Communication
MEDIA TYPE: Printed Publication
DESCRIPTORS: **screen printing**(graphic arts); positioning; machining accuracy; **printing** ink; sliding contact; elongation percentage; **test pattern; printed** board

27/9/5 (Item 2 from file: 94)
DIALOG(R)File 94:JICST-EPlus

01480833 JICST ACCESSION NUMBER: 92A0382496 FILE SEGMENT: JICST-E
Influence of screen printing conditions on resolving power.
YOKOZAWA YUJI (1); ITO YOICHI (1); SHIMADA MASAHIRO (1); SUZUKI MASAHIRO (1); KODERA SETSUO (1); MIYAJIMA RYOICHI (1)
(1) Tokyo Metrop. Industrial Technology Center
Tokyo Toritsu Kogyo Gijutsu Senta Kenkyu Hokoku(Report of the Tokyo **Metropolitan Industrial Technic Institute), 1992, NO.21, PAGE.47-50,** FIG.4, TBL.1, REF.2
JOURNAL NUMBER: S0759AAN ISSN NO: 0285-6670 CODEN: TKGHD
UNIVERSAL DECIMAL CLASSIFICATION: 655.3
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication
ABSTRACT: In the latest **screen printing,** the higher resolving power is much in demand from necessity of the accuracy and **density** in products such as the **printig** circuits of electronic parts and barcords of POS system. However, it is not eludicated what influence factors exert on the resolving power because there are too many factors around the power. It is then too time-consuming that we obtain the higher resolving power. Therefore, the purpose of this study is to express the relation between resolving power and **printing** factors by some figures with the application of **screen** printingtest chart, which we have developed. The results obtained show that the resolving power is affected by **screen** mesh conditions and viscosity of **screen printing ink,** and that the moire of **printing** decreases by the improvement of resolving power of **screen printing**. (author abst.)

L28 **ANSWER** 16 OF 22 **PIRA COPYRIGHT PIRA on STN**
AN 96:3102 PIRA Full-text
DN 20045095
TI THE LEAN, MEAN PRINTING MACHINE
AU Cassano T
SO Flexo, (1995) vol. 20, no. 11, Nov. 1995, pp 177, 180-181. ISSN:
0734-6980.
DT JOURNAL
LA ENGLISH
FS 08; PP (Printing and Publishing) ; PT (Printing Abstracts)
AB The technological tools now available enable converting an ordinary flexo press into a lean, mean, printing machine. Consistent **colour** and **tonal** reproduction demand a **predictable**, repeatable, **controllable printing** system. This can happen with doctor blades giving even, consistent, ink metering. Enclosed systems are more popular because of volatile organic compound emission legislation. Laser engraving of ceramic aniloxes produces engravings up to 1300 cells-per-inch; 60 degree hexagonal engraving creates cells with thin walls, yielding uniform ink films. The high line screens are reproducible, and minimise dot gain. The lower volume engravings achieve good colour. New thinner plate materials, shallower in relief, with appropriate density stickyback, give stability. Customised compatible components and testing will determine ideal component combinations. Downtime and waste will be saved, improving profitability. (6 fig)

L28 **ANSWER** 6 OF 22 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 1998-286312 [25] WPIX Full-text
DNN N1998-225121
TI Machine **control** method for copying/**printing** system - melding **predicted tone** reproduction curve and discrete number of tone reproduction samples to give reconstructed **tone** reproduction curve to **control** machine operation.
DC P75 P84 S06 T04
IN DIANAT, S A; JACKSON, E; KHARGONEKAR, P P; KODITSCHEK, D E; MESTHA, L K; THIERET, T E; WANG, Y R
PA (XERO) XEROX CORP
CYC 2
PI US 5749020 A 19980505 (199825)* 12 G03G015-00
JP 10181104 A 19980707 (199837) 10 B41J002-52
ADT US 5749020 A US 1996-754571 19961121; JP 10181104 A JP 1997-318570 19971119
PRAI US 1996-754571 19961121
IC ICM B41J002-52; G03G015-00
ICS G06T005-00; G06T007-00
AB US 5749020 A UPAB: 19980624

The method is for an imaging system having a control including a set of actuators for projecting an image onto an imaging surface and includes modelling the imaging system with respect to the actuators for producing a **predicted** tone reproduction curve defined by coefficients, basis functions, and a toner reproduction curve.

A discrete number of tone reproduction samples are then obtained, and the **predicted** tone reproduction curve and the discrete number of tone reproduction samples are melded to provide a reconstructed tone reproduction curve. The method responds to the reconstructed **tone** reproduction curve to **control** machine operation.

ADVANTAGE - Accurately reconstructs an entire reproduction curve while eliminating the need for multiple test patches. Dwg.1/7

3/9/6
DIALOG(R)File 2:INSPEC

4603657 INSPEC Abstract Number: B9404-7320P-001, C9404-5550-001
Title: Measurement of printer parameters for model-based halftoning
Author(s): Dong, C.-K.; Pappas, T.N.; Neuhoff, D.L.
Author Affiliation: First Boston Corp., New York, NY, USA
Journal: Proceedings of the SPIE - The International Society for Optical Engineering vol.1913 p.355-66
Publication Date: 1993 Country of Publication: USA
CODEN: PSISDG ISSN: 0277-786X
U.S. Copyright Clearance Center Code: 0 8194 1146 9/93/$6.00
Conference Title: Human Vision, Visual Processing, and Digital Display IV
Conference Sponsor: SPIE; Soc. Imaging Sci. & Technol
Conference Date: 1-4 Feb. 1993 Conference Location: San Jose, CA, USA
Language: English Document Type: Conference Paper (PA); Journal Paper (JP)
Treatment: Applications (A); Practical (P); Experimental (X)
Abstract: The authors present a new approach for estimating printer model parameters that can be applied to a wide variety of laser printers. Recently developed 'model-based' digital halftoning techniques depend on accurate printer models to produce high quality images using standard laser printers (typically 300 dpi). Since printer characteristics vary considerably, e.g. write-black vs. write-white laser printers, the model parameters must be adapted to each individual printer. Previous approaches for estimating the printer model parameters are based on a physical understanding of the printing mechanism. One such approach uses the 'circular dot-overlap model,' which assumes that the laser printer produces circularly shaped dots of ink. The 'circular dot-overlap model' is an accurate model for many printers but cannot describe the behaviour of all printers. The new approach is based on measurements of the gray level produced by various **test patterns** , and makes very few assumptions about the laser printer. The authors use a reflectance **densitometer** to measure the average brightness of the **test patterns**, and then solve a constrained optimization problem to obtain the printer model parameters. (11 Refs)
Subfile: B C
Descriptors: image processing; laser printers; optical variables measurement; parameter estimation; reflectivity

3/9/5
DIALOG(R)File 2:INSPEC

4690267 INSPEC Abstract Number: B9407-6140C-172, C9407-5550-003
Title: Measurement of printer parameters for model-based halftoning
Author(s): Pappas, T.N.; Chen-Koung Dong; Neuhoff, D.L.
Author Affiliation: Signal Process. Res. Dept., AT&T Bell Labs., Murray Hill, NJ, USA
Journal: Journal of Electronic Imaging vol.2, no.3 p.193-204
Publication Date: July 1993 Country of Publication: USA
CODEN: JEIME5 ISSN: 1017-9909
U.S. Copyright Clearance Center Code: 1017-9909/93/$6.00
Language: English Document Type: Journal Paper (JP)
Treatment: Theoretical (T); Experimental (X)
Abstract: We present a new approach for estimating printer model parameters that can be applied to a wide variety of laser printers. The new approach is based on measurements of the gray level produced by various **test patterns** and makes very few assumptions about the laser printer. We use a reflection **densitometer** to measure the average reflectance of the **test patterns** and then solve a constrained optimization problem to obtain the printer model parameters. To demonstrate the effectiveness of the approach, the model parameters of two laser printers with very different characteristics were estimated. The printer models were then used with both the modified error diffusion and the least-squares model-based approach to produce printed images with the correct gray-scale rendition. We also derived an iterative version of the modified error diffusion algorithm that improves its performance. (19 Refs)
Subfile: B C
Descriptors: **densitometry**; image processing; iterative methods; laser printers; least squares approximations; optimisation; parameter estimation; photoreflectance

3/9/3
DIALOG(R)File 2:INSPEC

5848155 INSPEC Abstract Number: A9807-4230-060
Title: Measuring MTF of paper by sinusoidal test pattern projection
Author(s): Inoue, S.; Tsumura, N.; Miyake, Y.
Author Affiliation: Res. Center, Mitsubishi Paper Mills Ltd., Tokyo, Japan
Journal: Journal of Imaging Science and Technology vol.41, no.6 p. 657-61
Publisher: Soc. Imaging Sci. & Technol,
Publication Date: Nov.-Dec. 1997 Country of Publication: USA
CODEN: JIMTE6 ISSN: 1062-3701
SICI: 1062-3701(199711/12)41:6L.657:MPST;1-P
Material Identity Number: P571-98001
Language: English Document Type: Journal Paper (JP)
Treatment: Theoretical (T); Experimental (X)
Abstract: Image quality of hardcopy is significantly influenced by paper characteristics. Light scattering phenomena in paper produce optical dot gain, which has a large influence on the tone reproduction characteristics of halftone images. Light scattering phenomena in paper can be represented by the modulation transfer function (MTF) of paper. However, little has been reported on techniques for measuring the MTF of paper. In this study, a new technique for measuring MTF of paper is proposed. We have developed a modified microdensitometer to project a sinusoidal **test pattern** on sample paper. The reflection density distribution of the projected sinusoidal **test pattern** was measured by the microdensitometer, and the MTFs of various types of papers obtained. The point spread function (PSF) of paper was calculated by the Fourier transform of the measured MTF. The PSF could be expressed by an exponential function. The obtained PSFs were applied to a model to predict reflection density of the halftone image. This result showed that the predicted density is approximately the same as the measured density in the halftone image and the estimated optical dot gain is well correlated to the measured optical dot gain. (11 Refs)
Subfile: A
Descriptors: **densitometry**; Fourier transform optics; light

5/3,AB,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01057732
METHOD AND DEVICE FOR CALIBRATING AN IMAGING APPARATUS
PATENT ASSIGNEE:
EASTMAN KODAK COMPANY, (201214), 343 State Street, Rochester, New York
INVENTOR:
SHOR, Steven, M. c/o Eastman Kodak Company , Patent Legal Staff 343 State
PATENT (CC, No, Kind, Date): EP 1033030 A1 000906 (Basic)
EP 1033030 B1 030507
WO 99026407 990527
APPLICATION (CC, No, Date): EP 98960235 981116; WO 98US24478 981116
PRIORITY (CC, No, Date): US 972102 971117

...SPECIFICATION image. The darker the image the more light it absorbs and the higher the density reading from the densitometer. During the calibration process a grayscale **test pattern** is printed which includes a series of halftone image regions. Each image region has a different predetermined dot area. For example a series of image...

...function based on current operating conditions. If the operating conditions change, such as the use of a new media type, the operator generates a grayscale **test pattern,** manually measures the densities with a densitometer, generates a transfer function and designates the new function for current use. If no major system change occurs...

...period such as several weeks.
Another RIP-based calibration technique sequentially changes software input variables such as resolution, frequency and medium (film/paper). A new **test pattern** is printed for each combination. The operator manually measures each **test pattern** with a densitometer and creates a plurality of transfer functions. The RIP selects the correct transfer function based on the current print job.
U.S...1 is a block diagram of an imagesetter having a calibration device in accordance with the present invention;
Figure 2 is an example of a **test pattern** suitable for use by the present invention in setting an optimal exposure setting;
Figure 3 is an example of a **test pattern** suitable for use by the present invention in performing exposure linearization; and
Figure 4 is flow chart illustrating one embodiment of a mode of operation...process consists of two phases: (1) exposure optimization phase and (2) exposure linearization phase.
During the exposure optimization phase, recorder 18 forms an exposure optimization **test pattern** on imaging element 24. Figure 2 illustrates one **test pattern** which may be used during the exposure optimization phase. Referring to Figure 2, recorder 18 forms image regions 601)) through 6010)) at a fixed halftone...

...controller 30 selects the different exposure levels in order to form a reduced number of image regions 60.
After recorder 18 forms the exposure optimization **test pattern** illustrated in Figure 2, densitometer 34 measures the densities of each image area 60 as imaging element 24 exits recorder 18. A light emitting component...

...60. For example, the following equation may be used to calculate the actual dot area: where DMIN equals the minimum density reading, DMAX equals a **maximum density** reading and D equals the density reading for the corresponding image area 60 for which an actual dot area is being calculated. Because DMAX for...
...element 24 is generally large, such as greater than 4.0, the equation essentially reduces to: In this manner, controller 30 need not measure a **maximum density** for the imaging element 24.
Based on these calculations, controller 30 generates a dot-area versus exposure curve for recorder 18. In one embodiment, interpolation...

14/3,AB,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00709688
Method for compensating for transfer characteristics of a printing system in a halftone screening process
PATENT ASSIGNEE:
ADOBE SYSTEMS INC., (1120810), 1585 Charleston Road, Mountain View
INVENTOR:
Borg, Lars, 331 Cuesta Drive, Los Altos, California 94024, (US)
PATENT (CC, No, Kind, Date): EP 673151 A2 950920 (Basic)
EP 673151 A3 951122
EP 673151 B1 000809
PRIORITY (CC, No, Date): US 213443 940315
ABSTRACT EP 673151 A2
A method of compensating for a **predetermined** transfer characteristic of a printing device in a halftoning process for screening an image containing a particular gray level value selected from a **predetermined** finite number of gray level values, including the steps of (1) selecting for the particular gray level value a bit pattern from a large plurality of bit patterns which is larger than the **predetermined** finite number of gray levels, the selection being based upon the application of a **predetermined** transfer characteristic of the printing system; and (2) printing the area of the image having the particular selected gray level value using the selected bit pattern, or storing the selected bit pattern as part of a threshold array. In one embodiment the **predetermined** transfer characteristic is a dot gain compensation function. (see image in original document)

L23 **ANSWER** 3 OF 16 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 2003-114167 [11] WPIX Full-text
DNN N2003-090863
TI Method for regulating color density in web offset printing uses measuring heads to utilize the direction of feed for a length of material to perform integrating measurement of light returned by a printed length of material..
DC P74
IN RIEPENHOFF, M
PA (WIFA-N) MASCHFAB WIFAG; (RIEP-I) RIEPENHOFF M
CYC 27
PI EP 1273445 A2 20030108 (200311)* GE 12 B41F033-00
US 2003005841 A1 20030109 (200311) B41F001-54 <--
DE 10131934 A1 20030130 (200317) B41F033-10
ADT EP 1273445 A2 EP 2002-405475 20020611; US 2003005841 A1 US 2002-186590 20020701; DE 10131934 A1 DE 2001-10131934 20010702
PRAI DE 2001-10131934 20010702
IC ICM B41F001-54; B41F033-00; B41F033-10
AB EP 1273445 A UPAB: 20030214
NOVELTY - A machine (1) prints a length of paper (2), over which is set a measurement head (3) with a lighting device connected to a source (31) of light via a glass fiber cable (32) that feeds light reflected from a length of paper into a spectrometer (33) controlled by a computer so as to adapt measurements to rotational speed.

DETAILED DESCRIPTION - A sensor element picks the light up as reflected from a moving length of printed material. An integrating device linked to the sensor element detects the intensity of the light picked up. An INDEPENDENT CLAIM is also included for a device for regulating color density in web offset printing.

USE - For automatic control of coloring in graphics printing.

ADVANTAGE - A controller for intensity measurement of reflected light integrating in the direction of movement of the length of material uses an integrating device to set a time period in advance for picking up light and/or a time period for integration.

DESCRIPTION OF DRAWING(S) - The drawing shows a systems diagram for carrying out spectral measurement. (Drawing includes non-English language text).

Machine 1
Length of paper 2
Measurement head 3
Source of light 31
Glass fiber cable 32
Spectrometer 33

L48 **ANSWER** 13 OF 14 **PIRA COPYRIGHT PIRA on STN**
AN 94:5320 PIRA Full-text
DN 20005456
TI NO PAIN, NO GAIN
AU Tritton K
SO Printweek, (1994) 4 Mar. 1994, pp 25, 27. ISSN: 0987-987X.
DT JOURNAL
LA ENGLISH
FS 08; PP (Printing and Publishing) ; PT (Printing Abstracts)
AB Apparent dot gain, or tone value change, occurs during dot transfer from imagesetter film to plate to substrate. Dot area on the film can be **measured** and calibrated in prepress. Apparent dot size is **controlled** densitometrically. Variation in **tint** block density, caused by varying dot gain, needs better platemaking **control, press adjustment**, and materials. **Consistent** dot gain is essential for good colour matching. For proof and production print to match, all print parameters, particularly dot gain, must be comparable. Unequal dot growth produces lack of contrast or gradation, or a colour cast. Excessive dot gain during printing gives incorrect tone reproduction. If dot growth exceeds normal levels, dot gain curves for substrate classes must be established, prepress films **compensated**, and dot gain **control** instituted in proofing and **printing**. (3 fig)

L28 **ANSWER** 15 OF 22 **PIRA COPYRIGHT PIRA on STN**
AN 96:15954 PIRA Full-text
DN 20057040
TI Off-press proofing and printing of stochastic screen separations
AU Long J W; Viereck R W
SO (1995) Towards 2000 - evolution or revolution? Fourth technical symposium on prepress, proofing and printing, Chicago, IL, USA, 8-11 Oct. 1995, pp 102-104 [Arlington, VA, USA: Society for Imaging Science and Technology, **1995, 174pp $55.00 (ISBN 0-89208-186-4)(655.024:681.3)(11479)].**
DT CONFERENCE
LA ENGLISH
FS 08; PP (Printing and Publishing) ; PT (Printing Abstracts)
AB The experience of industry in implementing a successful production process for reproduction of stochastic screening has been mixed. The small dots used in the process may increase the process variability. The variables that must be controlled for each step to achieve routine process **control** for **predictable printing** when using stochastic **screening** are discussed. The **compensation tone** curves required to obtain optimum proof to press visual simulation, and the process control tools needed to monitor the reproduction process are examined. The DuPont Waterproof proofing system can be used to set compensation for stochastic screening and accurately **predict printing** results. (4 fig, 1 tab)

L23 **ANSWER** 16 OF 16 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 1987-186830 [27] WPIX DNN N1987-139639
TI Photoelectric control of colour application in offset printing - using spectral analysis and colorimetry instead of simple densitometry for control of printing colour guide console.
IN KELLER, G; KIPPHAM, H; LOFFLER, G; OTT, H; KIPPHAN, H; LOEFFLER, G
PA (GRET) GRETAG AG; (HEIC) HEIDELBERGER DRUCKMASCH

PI	**EP 228347**	**A**	**19870708 (198727)***	**GE**	**13**		
	EP 228347	**B**	**19891025 (198943)**	**GE**			
	US 5182721	**A**	**19930126 (199307)**		**17**	**G01J003-46**	**<--**
	EP 228347	**B2**	**19961113 (199650)**	**GE**	**14**	**B41F033-00**	
	US 6041708	**A**	**20000328 (200023)**			**B41M001-14**	

AB EP 228347 A UPAB: 19971013
A measuring head (101) is driven by a stepping motor (102) across a printed sheet (40) on which colorimetric fields (41) are arranged for photoelectric measurement. A manual head (103) can be positioned opposite the desired area. Both heads (101,103) are connected by lightguide (104) to a spectrometer (105) from which measurements of reflected light are transmitted to a computer (106) producing control signals for the on console in command of the colour guide.

The motor (102) and light sources are powered from an electronic unit (107), which the computer (106) controls in conjunction with a display monitor (108), keyboard (110) and peripheral printer (109). The measured data are processed in association with desired values in a chosen colour co-ordinate system.

ADVANTAGE - Control is improved for higher degree of conformity of image and colour imprints.

ABEQ EP 228347 B UPAB: 19961211
A process for controlling the application of ink by a printing machine in which a printed sheet, printed by the printing machine, is measured colorimetrically in a number of test areas with reference to a selected colour coordinate system, the resulting colour location coordinates are processed in conjunction with reference values to produce control data for the inking process elements of the printing machine, and the inking process of the printing machine is controlled automatically using those control data, wherein there are used as reference values reference colour location coordinates based on the same selected colour coordinate system, wherein starting from the colour location coordinates for the measured test areas the colour deviation vectors to those reference colour location coordinates are determined, wherein the colour deviation vectors are converted into the control data necessary for controlling the inking process of the printing machine, for example into changes in layer thickness, and wherein the inking process of the printing machine is controlled on the basis of the control data converted from the colour deviation vectors.

ABEQ US 5182721 A UPAB: 19930922
Colour measuring fields provided on printed sheets are evaluated not as heretofore densitometrically but colorimetrically by means of spectral measurements. Spectral reflections are used to match colours, or colour coordinates are calculated from them and compared with corresp. set reflections or set colour coordinates. The colour deviations obtained in this manner are used to control the inking processor. For the stabilisation of printing runs the spectral reflections are converted into filter colour densities and the inking process is controlled on the basis of these colour densities in a conventional manner.

The control of the inking process using colour deviations and control using colour density may be superposed upon each other. The process makes it possible to adapt colour impressions in delicate locations of importance for the image in the print to the corresp. locations of the proof. Colour deviations due to different material properties and other error sources may also be equalised to some extent.

USE - To improve control of inking process in offset printing machine.

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L23  ANSWER 2 OF 16  WPIX COPYRIGHT  THOMSON DERWENT on STN
AN   2003-429769 [40]   WPIX  Full-text
DNN  N2003-343193
TI   Position-aware freeform printing method involves rendering target image to
     predicted target image space in freeform manner based on source image and
     absolute position information of source image.
DC   P75 T01 T04
IN   CHURCHILL, E F; DENOUE, L; GOLOVCHINSKY, G; NELSON, L D; SCHILIT, W N
PA   (XERF) FUJI XEROX CO LTD
CYC  2
PI   US 2003051615    A1 20030320 (200340)*      25    B41L047-64     <--
     JP 2003178317    A  20030627 (200351)       25    G06T011-80
ADT  US 2003051615 A1 US 2001-951607 20010914; JP 2003178317 A JP 2002-268838
     20020913
PRAI US 2001-951607         20010914
IC   ICM  B41L047-64; G06T011-80
     ICS  B41J002-00; B41J002-475; B41L039-00; B41L047-58; B41L047-62;
          G06F003-03; G06F003-12
AB    US2003051615 A UPAB: 20030624
      NOVELTY - A source image having source image space (103), is selected. A
      target image space is predicted for transferring the source image. A target
      image is rendered into target image space (105) in a freeform manner based on
      selected source image and absolute position information of source image.
           DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the
      following:
           (1) position aware freeform printing system;
           (2) carrier wave encoded to transmit control program for a position aware
      freeform printing system; and
           (3) computer readable storage medium having control program for position-
      aware freeform printing system.
           USE - For printing ad-hoc, informal, situation-specific data information
      such as phone numbers, reference numbers, uniform resource locator, etc.,
      using handheld printers.
           ADVANTAGE - Since the printing is performed by moving the printing device
      over the target image space in a freeform manner, the data information is not
      skewed while performing the printing process. Thereby image reproduction is
      performed easily.
           DESCRIPTION OF DRAWING(S) - The figure shows the position aware freeform
      printing system.
           source image space 103
           target image space 105
```

L61 **ANSWER** 8 OF 11 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 1999-320119 [27] WPIX Full-text
DNN N1999-240333
TI Printing device for e.g. laser printer, digital copier - has image selection circuit which outputs compensated image data corresponding to corrected image pixel, and thinned image to printing unit with respect to mask pattern that is chosen based on input image data.
DC P84 S06 T01 W02
PA (RICO) RICOH KK
CYC 1
PI JP 11112789 A 19990423 (199927)* 7 H04N001-387
ADT JP 11112789 A JP 1997-287636 19971006
PRAI JP 1997-287636 19971006
IC ICM H04N001-387
ICS G03G021-00; G06T001-00; G06T003-40; H04N001-409
AB JP 11112789 A UPAB: 19990714

NOVELTY - The compensated image data corresponding to a predetermined pixel which undergoes an image correction, and the thinned image data are output by an image selection circuit (5) to a printing unit (6) with reference to a mask pattern that are selected depending on the input image data. DETAILED DESCRIPTION - An image compensation circuit (3) **performs** the compensation process of the input image data stored in an image buffer (2). The compensated image data are applied to the image selector (52) of the image selection circuit. A **toner controller** (4) chooses the mask pattern depending on the input image data and output mask control signal showing the selected mask pattern to the mask controller (51) of the image selection circuit. The mask controller **performs** the thinning of the input image data that are not corrected.

USE - For e.g. laser printer, digital copier.

ADVANTAGE - Suppresses consumption amount of **toner** without deteriorating picture quality. DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of a printing device. (2) Image buffer; (3) Image **compensation** circuit; (4) **Toner controller;** (5) Image selection circuit; (6) **Printing** unit; (51) Mask **controller;** (52) Image selector.

```
L23  ANSWER 7 OF 16  WPIX COPYRIGHT  THOMSON DERWENT on STN
AN   2000-024616 [03]   WPIX  Full-text
DNN  N2000-018336
TI   Procedure to operate image data orientated printer.
DC   P74 S06 T01
IN   DILLING, P
PA   (MAUG) MAN ROLAND DRUCKMASCHINEN AG
CYC  4
PI   DE 19822662     A1 19991125 (200003)*     17    B41F033-16
     JP 11342597     A  19991214 (200009)      14    B41F033-16
     GB 2340075      A  20000216 (200011)            B41F033-00
     US 6230622      B1 20010515 (200129)            B41F013-00     <--
     JP 3241343      B2 20011225 (200203)      14    B41F033-16
     GB 2340075      B  20030312 (200319)            B41F033-00
     DE 19822662     C2 20031224 (200403)            B41F033-16
ADT  DE 19822662 A1 DE 1998-1022662 19980520; JP 11342597 A JP 1999-140815
     19990520; GB 2340075 A GB 1999-11687 19990519; US 6230622 B1 US
     1999-315553 19990520; JP 3241343 B2 JP 1999-140815 19990520; GB 2340075 B
     GB 1999-11687 19990519; DE 19822662 C2 DE 1998-1022662 19980520
FDT  JP 3241343 B2 Previous Publ. JP 11342597
PRAI DE 1998-19822662     19980520
IC   ICM  B41F013-00; B41F033-00; B41F033-16
     ICS  B41F031-02; B41F033-14; G06F013-00; G06F019-00
AB    DE  19822662 A UPAB: 20000118
```

NOVELTY - Uses expert system which stores basic information of cooperation of media in printer from test prints or during production run. Stored data is used in specific intervals and specific control loops to provide fully automatic color location control and color density control.

DETAILED DESCRIPTION - The expert system is stored in an operation state computer connected with the printer. It is used to control doctor blade position. Error prevention is realized in a stepped system parallel to the color and color density regulation and realized in three control loops. Basic calibration (1) is carried out for color reproduction in a first quality step, second step is imaging of surfaces and grid (2) and in a third step, color density is regulated (3). An INDEPENDENT CLAIM is included for the printer.

USE - To prevent errors in printing system, for intaglio printing, offset printing, flexographic printing.

DESCRIPTION OF DRAWING(S) - The drawing shows the influencing of the image data.

```
L23  ANSWER 8 OF 16  WPIX COPYRIGHT  THOMSON DERWENT on STN
AN   1999-303970 [26]   WPIX  Full-text
DNN  N1999-227747
TI   Process for determining ink coverage of printed image.
DC   P74 S03
IN   OTT, H; PFEIFFER, N; SCHNEIDER, M
PA   (HEIC) HEIDELBERGER DRUCKMASCHINEN AG
CYC  3
PI   DE 19830487     A1 19990512 (199926)*      6    B41F033-10
     JP 11227165     A  19990824 (199944)       8    B41F031-02
     US 5967033      A  19991019 (199950)            G01J003-46     <--
ADT  DE 19830487 A1 DE 1998-1030487 19980708; JP 11227165 A JP 1998-316046
     19981106; US 5967033 A US 1998-185122 19981103
PRAI DE 1997-19749065        19971106
IC   ICM  B41F031-02; B41F033-10; G01J003-46
     ICS  B41F031-00; G01B011-28
AB    DE  19830487 A UPAB: 19990723
      NOVELTY - From the visible spectrum scanner signal of an image color
      coordinates, a matched color system is developed. For each element of the
      image a similar sampling in the near infrared range is made, that permits an
      infrared based coordinate system to be determined. From the two coordinate
      systems a determination of both the color (CM) and black ink coverage for each
      image element can be determined.
           USE - Determination of ink coverage of an image especially for use with
      offset printer systems.
           ADVANTAGE - Use of commercially available scanners and PCs permits a low
      cost determination of color characteristics over a fine (2.5 mm square) mesh
      using the described process. Dwg.2/2
```

L28 **ANSWER** 14 OF 22 **PIRA COPYRIGHT PIRA on STN**
AN 1998:26303 PIRA Full-text
DN 20121550
TI Quick Tips. Considerations for consistent color
AU Kiddell P; Burnside C
SO Screen Print., (1998) vol. 88, no. 10, Sept. 1998, pp 76, 78, 80. ISSN:
0036-9594.
DT JOURNAL
LA ENGLISH
FS 08; PP (Printing and Publishing) ; PT (Printing Abstracts)
AB The article explains the ways in which process variables such as ink mixing, mesh selection, screen tension, press settings, drying, substrate characteristics and viewing conditions most often contribute to **colour** change during **screen** printing. The key to uniform and **predictable colour** is process **control**. **Screen printers** are advised to aim for accuracy in the ink room, understand how the variables discussed above contribute to colour problems and recommended to keep detailed records of the settings and procedures that lead to quality colour, so that the results can be repeated.

L23 **ANSWER** 9 OF 16 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 1999-279525 [24] WPIX Full-text
DNN N1999-209625
TI Regulation of color in a printing process.
DC P74 S06 T06
IN AMMETER, H; OTT, H; PFEIFFER, N; SCHNEIDER, M
PA (HEIC) HEIDELBERGER DRUCKMASCHINEN AG
CYC 27

PI	**EP 914945**	**A2**	**19990512**	**(199927)***	**GE**	**16**	**B41F033-00**	
	DE 19749066	**A1**	**19990512**	**(199925)**		**13**	**B41F033-00**	
	JP 11216848	**A**	**19990810**	**(199942)**		**13**	**B41F031-02**	
	US 5957049	**A**	**19990928**	**(199947)**			**B41F031-00**	**<--**
	EP 914945	**B1**	**20020731**	**(200257)**	**GE**		**B41F033-00**	
	DE 59804980	**G**	**20020905**	**(200266)**			**B41F033-00**	

PRAI DE 1997-19749066 19971106
IC ICM B41F031-00; B41F031-02; B41F033-00
ICS B41F033-10; G01J003-46; G06K009-00
AB EP 914945 A UPAB: 19991122

NOVELTY - The offset printing machine has a sheet (3) with a matrix of color printed elements (4) that are scanned by a sensor (2). The color pattern is compared with that of a reference and a sensitivity matrix is established. In particular the effect of variations such as sheet thickness are established and the printing process modified.

USE - As an offset printing processes.

ADVANTAGE - Improved color quality is achieved.

DESCRIPTION OF DRAWING(S) - The drawing shows a schematic of the system.

Color sensor 2
Printed sheet 3
Matrix of color elements 4

6/9/6
DIALOG(R)File 248:PIRA

00309125 Pira Acc. Num.: 10181201 Pira Abstract Numbers: 08-92-PT01647
Title: A SPECIAL VFG-GLV TEST TARGET FOR POSTSCRIPT OUTPUT DEVICES
Authors: Sobotka W; Handler C
Source: Paper presented at TAGA proceedings 1991 held 5-8 May 1991, at Rochester, NY, USA, pp 63-74 [Rochester, NY, USA: Technical Association of the Graphic Arts, 1991, 774pp, (655.1.001.891)(9391)
Publication Year: 1991
Document Type: Conference Publication
Language: English
Pira Subfiles: Printing and Publishing (PP); Printing Abstracts (PT)
Journal Announcement: 9205
Abstract: For some time, commercially available test targets for PostScript laser exposing units, and their performance, have been unsatisfactory and inadequate. Personal computer-based complete image and typesetting systems, with page make-up, halftoning, and RIP software, are available at affordable prices for desktop publishing. Text and line graphics for internal documentation are produced at 300dpi. Halftones require 800 or 1000dpi for 85 or 105lpi screen, or at least 1200dpi on silver halide film for 133lpi, magazine quality, **screens**. Two **test** targets for use with PostScript output devices are presented. They are used for calibration, resolution, spot size, controlling exposure, **density** uniformity, and **screen** angle stability.

3/9/7

DIALOG(R)File 2:INSPEC

02306184 INSPEC Abstract Number: B84048754

Title: Techniques of adaptive threshold setting for document scanning applications

Author(s): Hsing, T.R.
Author Affiliation: GTE Labs. Inc., Waltham, MA, USA

Journal: Optical Engineering vol.23, no.3 p.288-93
Publication Date: May-June 1984 Country of Publication: USA
CODEN: OPEGAR ISSN: 0091-3286
Language: English Document Type: Journal Paper (JP)
Treatment: Practical (P)

Abstract: In the application of bilevel digital display and electronic printing, threshold setting is used to get binary images from optical scanning digitizers. Such images can be simply obtained from a raw continuous-tone image by using a fixed threshold. However, due to (1) a wide range of background colors, (2) wide variations of **density** in the **printed** information, and (3) the shading effect caused by imaging optics, adaptive threshold setting is obviously needed for obtaining high-quality displays and hard copies. The author reviews both known and newly developed adaptive threshold techniques. Simulated **test patterns** were used to make the comparison quantitatively. The techniques reviewed include the fixed threshold, peak and valley detector, gradient detector, fractional average context, transition-refreshed peak and valley detector, and robust two-dimensional adaptive thresholder. Among them, the last technique is found to perform very robustly in the presence of shading as well as text density variation. (11 Refs)

Subfile: B
Descriptors: adaptive optics; image sensors
Identifiers: **printed** information **density** variations; simulated **test patterns**; adaptive threshold setting; document

3/9/1

DIALOG(R)File 94:JICST-EPlus

02310376 JICST ACCESSION NUMBER: 95A0131897 FILE SEGMENT: JICST-E

This is the best method for colorization of light **printing.** As to "UGURA (Web gravre)/FOGURA (photogravure)/KOHAN (mimeography, **screen** process **printing**, etc.), VELVET, **SCREEN".**

TERADA TAKESHI (1)
(1) Kohan

Insatsukai, 1994, NO.488, PAGE.140-144,145-147,144(1)-144(2), FIG.12
JOURNAL NUMBER: S0178AAO ISSN NO: 0020-1766
UNIVERSAL DECIMAL CLASSIFICATION: 655.2
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Commentary
MEDIA TYPE: Printed Publication

ABSTRACT: Following the previous report this explains about high-definite **screening** and FM **screening**. Stating the defect of high-definite **screening,** this report shows an enlarged image of the structure of FM **screen**. Explaining about (1) an image-processing method with velvet **screen** program, (2) the hardwares and softwares necessary for it, and (3) testcharts especially necessary for FM **screening,** this report explains about the excellence and developability of the titled **screen**.

DESCRIPTORS: inplant **printing;** image processing; software; **screen;** frequency modulation; **test pattern**

L28 **ANSWER** 22 OF 22 **PIRA COPYRIGHT PIRA on STN**
AN 89:10799 PIRA Full-text
DN 02-90-00183
TI A TRIP TO MEMORY LANE
AU Anon
SO Reproduction, (1989) vol. 25, no. 8, Aug. 1989, p. 27. ISSN: 0034-4958.
DT JOURNAL
LA ENGLISH
FS 02; PR (Printing Abstracts)
AB Memory Lane Photographic Galleries converts old prints intofaithful copies. Their technique combines photographic methods and electronic systems. Conventional practice was broken. Copyproof 2200 Repromaster camera and Agfa processor package were chosen; the automatic **controls** for **tonal** range **prediction** and exposure were critical. A variety of line, **tone** or **screen** effects are achieved. Stages in the process are reduced drastically. Sepia toning (the greatest challenge) was developed with an on-line densitometer. Special exposures through contrast **control screens** retain detail while accentuating contrast. Conventional production times and costs were cut by at least 50%.

L61 **ANSWER** 7 OF 11 **WPIX COPYRIGHT THOMSON DERWENT on STN**
AN 1999-503614 [42] WPIX Full-text
DNN N1999-376425
TI Video **controller** in **toner** cartridge of electrophotographic printer e.g. laser printer - compares two different operating times of printer stored in memories, and judges whether **toner** density **compensation** detection in **printer** is **performed** or otherwise based on comparison result.
DC P75 P84
PA (CANO) CANON KK
CYC 1
PI JP 11218972 A 19990810 (199942)* 12 G03G015-00
ADT JP 11218972 A JP 1998-21279 19980202
PRAI JP 1998-21279 19980202
IC ICM G03G015-00
ICS B41J029-46; G03G021-00; G03G021-18
AB JP 11218972 A UPAB: 19991014
NOVELTY - The video controller (200) compares two different operating times of a printer (100) stored in memories e.g. a read only memory ROM, a random access memory RAM. The **controller** then decides whether the **toner** density **compensation** detection in the **printer** is **performed** or otherwise based on the comparison result. DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a printing method.

USE - For use in **toner** cartridge of electrophotographic printer e.g. laser printer.

ADVANTAGE - Prevents unnecessary **toner** density **compensation** detection especially during replacing of **toner** cartridge or power cut off of printer. DESCRIPTION OF DRAWING(S) - The figure shows the schematic diagram of the laser printer connection to a computer. (100) **Printer;** (200) Video **controller**.

19/TI,PN,PD,AN,AD,IC,AB,AB,K/4 (Item 2 from file: 349)

VISUAL CALIBRATION

Patent and Priority Information (Country, Number, Date):

Patent: **WO 200036819 A1 20000622 (WO 0036819)**

Application: **WO 99US25578 19991028 (PCT/WO US9925578)**

Main International Patent Class: H04N-001/60

English Abstract

A calibration apparatus and method for a color printer that allows a user to calibrate a printer without the use of expensive measuring instruments and prior user training is provided. The calibration process prints out two target layouts. On the first target the user selects the primary **inks** start and end points (highlights and shadows), and the black **ink** only input value that generates a 30 % gray. The primary **inks** are the device-dependent colorants, cyan, magenta and yellow. The second target compares the 30 % black **ink** with grays made of a combination of cyan, magenta and yellow **inks**. The user selects the best match in an iterative process. Using this data, calculations are made of the **corrections** to the original input signal values for the printer. A look up table is updated with **corrected** input values to **compensate** for the printer deviation from its standard behavior.

p. 1

Detailed Description

Users currently calibrate a printer or copier using a **densitometer** or a scanner. For purposes of the invention described herein, calibration means adjustments to single toner or ink values, through one-dimensional lookup tables, to provide for steady, **predictable** color printing. This document describes the goals, techniques and a proposed development plan for a calibration system that involves neither a densitorneter nor a scanner...

...J. Rolleston et al., Color
I
Most methods for calibration in the sense of the invention involve the use of possibly expensive instruments such as **densitometers** or scanners to measure the color response of the printer in comparison with a goal response, the color response and the goal response expressed in...

...based calibration leads to consistent results because the human factor is minimized. The time it takes to calibrate and the quality of the results are **predictable**.

Although custom calibration goals need to be prepared by a skilled operator, a minimally trained operator can perform a very good calibration.

Human vision based...

...choice than visual based calibration.

3
0 Instruments cost money. The user may want good color quality, but may not be ready to purchase a **densitometer**, that is more expensive than many low end printers, preexisting reference targets.

0 Instruments can deliver unreliable results. Some low-end printers are incapable of producing the same color across the page. Tints and solids may not print at the same density across the page. Hence a **densitometer** may measure very precisely an incorrect value due to the location of the sample, whereas an operator naturally compensates ...for such problems
* Papers can be unreliable. Very often, lower quality papers are irregular in thickness and coating. Printed results can therefore vary

widely, affecting **densitometer** measurements.

* An operator could feed the printer with a different paper than that expected by the calibration system. Also, an operator may not notice a certain spot on a specific sheet of paper where a sample is measured. This happens often because the operator has too much confidence in the **densitometer** and is less prone to verify his work.

0 No calibration method is known that allows for visual calibration to arbitrary color response goals or...

...a user to calibrate a printer without having prior training and without the use of expensive measur ng instruments. The invention is also compatible with **densitometer** calibration. The invention does not require specially preprinted targets, which can be costly and difficult to manufacture, and which can fade over time. The invention...

...dimensional lookup tables that modify the behavior of color toners or inks for cyan, magenta, yellow, and black of the printer to provide for steady, **predictable** color printing. This process of applying four curves or one-dimensional lookup tables works well in practice, and in theory works perfectly well when the...

p. 2

...allows a user to calibrate a printer without having prior training and without the use of expensive measuring instruments. The invention is also compatible with **densitometer** calibration. The invention does not require special preexisting reference targets, which can be costly and difficult to manufacture, and which can fade over time. The...

...onedimensional lookup tables that modify the behavior of color toners or inks for cyan, magenta, yellow, and black of the printer to provide for steady, **predictable** color printing. This process of applying four curves or one-dimensional lookup tables user can be used to correct an error.

There are several methods...in 50 and 55. If any of the selected values are the out of range values, the Limits page may be regenerated with a modified **test pattern** closer to the specific printer response and reprinted automatically.

Determining the primary toners or inks start points is necessary because for example four percent of...or Power Saver Mode (300) a user presses the Menu button repeatedly (301) to advance to the Visual Calibration screen (302). To advance to the **Print** Limits **screen** (303) the user **presses** Enter (304). To print the Limits page the user presses the up and down arrow keys and selects Yes (305). To reset the printer's ...

Claim

... calibrating a color printing device, such as a color printer, including the steps ofprinting a first target layout, which includes graduated primary color toner or **ink** patches to detect a printing device's primary color start and end points and graduated black toner or **ink** circles to detect a printing device's percentage dot gain;
comparing visually said primary color toner or **ink** patches and said black toner or **ink** patches and choosing the said primary toner or **ink** start and end points
and said black toner or **ink** tone response;
generating a black transfer curve using said black start and end points and said black tone response, thereby finding the function that **compensates** for the drift in the
printing device;
printing a second target layout, which incorporates said black transfer curve as background gray and includes patches of gray made of mixtures of primary color
toners or **inks** such as for example cyan, magenta, and yellow
inks (CMY);

comparing visually said background gray with said CMY grays and choosing best match from said CMY patches;
performing said comparison of background gray to CMY gray patches in an iterative process until acceptable match is found;
generating transfer curves for primary toners or **inks** using above said start and end points and said black transfer curve, thereby finding functions that **compensate**
for the drift of the primary colors of the printing device; and
updating each one-dimensional lookup table (LUT) with said **compensating**
functions.

2 A method for calibrating a color printing device as in Claim 1, wherein a visual comparison can be performed by any user, not necessarily an experienced user.

3 A method for calibrating a color printing device as in Claim 1, wherein a goal toner or **ink** density can be arbitrarily chosen or generated from an ICC (International Color Consortium) profile.
14

p. 3

4 A method for calibrating a color printing device as...

...coarse or fine iterations.
5 A method for calibrating a color printing device as in Claim 1, wherein intelligent variations for a goal toner or **ink** density can be generated by a user to **correct** an error.

6 A target layout as defined in Claim 1, wherein graduated primary color **ink** patches are included to detect a printing device's primary color start and end points and graduated black toner or **ink** patches are included to detect a printing device's black channel tone response.

7 A target layout as defined in Claim 1, wherein said black...

...other columns address hues variation;
a plurality of columns of patches, wherein every primary hue is addressed; and a frame of pure black toner or **ink** such that said frame is located around said patches in such a way as to provide a border around said patches.
15

9 Color patches as defined in Claim 8, further comprising:
toner or **ink** values within a range from zero to 255;
individual steps of said toner or **ink** values, wherein said steps are a gradation of positive powers of two including for example one, two, four, and eight; and an arrangement such that said toner or **ink** values are in a sequence that allow io access to said individual steps in said gradation.

10 A target layout as defined in Claim 1, further comprising:
a central region of patches wherein a toner or **ink** value from a first patch in said region may vary with a toner or **ink** value of a second patch in said region; and a peripheral region of patches wherein a toner or **ink** value from a first patch in said region may vary with a toner or **ink** value of a second patch in said region.

11 A central region and a peripheral region as defined in Claim 1 0, further
comprising:
a...

...for each one of those grays a CMY match can be found.

13 A method as in Claim 1, wherein the method is compatible with **densitometer** calibration.

14 A method as in Claim 1, wherein the method does not require a preexisting reference target.
16

15 A method of performing a calibration on a printing device including the steps of. requesting from an input device to advance to a visual calibration **screen**;
requesting to **print** first target page from said input device;
following instructions provided on said target page to input values representing primary color toner or **ink** limits and black percentage;
requesting to print second target page from said input device;
following instructions provided on said second target page to input values
representing the best patch of CMY gray;
performing above steps iteratively until an acceptable match is found;
printing a color **test** page that uses the original calibration values;
printing a color **test** page that uses the new calibration values; and
accepting said new calibration values by providing input value or values into said input device to said...
...fine iterations.

p. 4

18 A method of performing a calibration on a printing device as in Claim 15 wherein intelligent variations for a goal toner or **ink** density can be generated by a user to **correct** an error.
17

19 An apparatus for calibrating a color printing device, comprising:
a first target layout, which includes graduated primary color toner or **ink** patches to detect a printing device's primary color start and end points and graduated black toner or **ink** patches to detect a printing device's black channel tone response, wherein a user compares visually said primary color toner or **ink** patches and said io black toner or **ink** patches and chooses said primary toner or **ink** start and end points
and said black toner or **ink** tone response;
means for generating a black transfer curve using said black start and end points and said tone response, thereby finding a function that **compensates** for the
drift in said color printing device;
a second target layout, which incorporates said black transfer curve as background gray and includes patches of gray made of mixtures of primary color toners or **inks** such as for example cyan, magenta, and yellow **inks** (CMY), wherein a user compares visually said background gray with said CMY grays and chooses a best
match from said CMY patches;
wherein said comparison...

...CMY gray patches is an
iterative process that is performed until an acceptable match is found;
means for generating transfer curves for primary toners or **inks** using above said start and end points and said black transfer curve, thereby finding functions that **compensate** for the drift of the primary colors of the printing device; and
means for updating each one-dimensional lookup table (LUT) with said **compensating** functions.

20 An apparatus for calibrating a color printing device as in Claim 19, further comprising a plurality of target layouts, each layout having different...

...any user, not necessarily an experienced user.
18
23 An apparatus for calibrating a color printing device as in Claim 19, wherein said toner or **ink** density with which said visual comparison

is made can be arbitrarily chosen or generated from an ICC. lo 24. An apparatus for calibrating a color...

...not require preexisting reference targets.

25 An apparatus for calibrating a color printing device as in Claim 19, wherein said apparatus is compatible with a **densitometer**.

26 An apparatus for calibrating a color printing device as in Claim 19, wherein intelligent variations for a goal toner or **ink** density can be generated by a user to **correct** an error. 2o 27. An apparatus to perform a calibration on a printing device, comprising: an input device to advance to a visual calibration screen...

...input device that a first target page be printed;
wherein instructions are provided on said target page to input values representing primary color toner or **ink** limits and black
percentage;
wherein a user may request from said input device that a second target
page be
printed;
wherein instructions are provided on...

p.5

...of CMY gray;
wherein said above steps may be performed iteratively until an acceptable
appearance match is found;
a printing device for printing a color **test** page that uses the
original calibration values, wherein said printing device prints a color
test page that uses the new
calibration values; and
means for accepting said new calibration values by providing input values
into
said input device to said...v i In No reprint automatically
range 1-8 and are with updated data;
not 0 or user values must
be re-entered
es
309-
Print Grays **screen** appears;
Use up and down arrows to
select Yes to print
Gray Balance page
Follow instructions provided
on Gray Balance page
310
/ r 312
311
n e Gray Balance page
ow=O as es
atch reprints automatically
FIG e 3A es
(To Fig. 3B)
(To Fig, 3A)
313
Print Color **Test**
screen appears
314 n 1-315
a or ' st Yes Press up and
at uses ori inal down keys and
values select Yes
0
316 Pr t /-317
o or T t es Press up and
that uses new down keys and
values select Yes
318 -
I

Compare Color **Test** that us

es
Origial values against Color
Test that uses new values
319
at isf ie
nter's ca i ra No
based on
values
e 320
Select Yes from
APPLY CHANGES **screen**
that appear
321-
11
Press Enter to recalibrate
the printer based on
previously entered values
FIG* 3B
10 -
201 Printer / Copier
Operator Engine
Panel /
Keypad (Input) pa
40
Lookup Tab...

p. 6